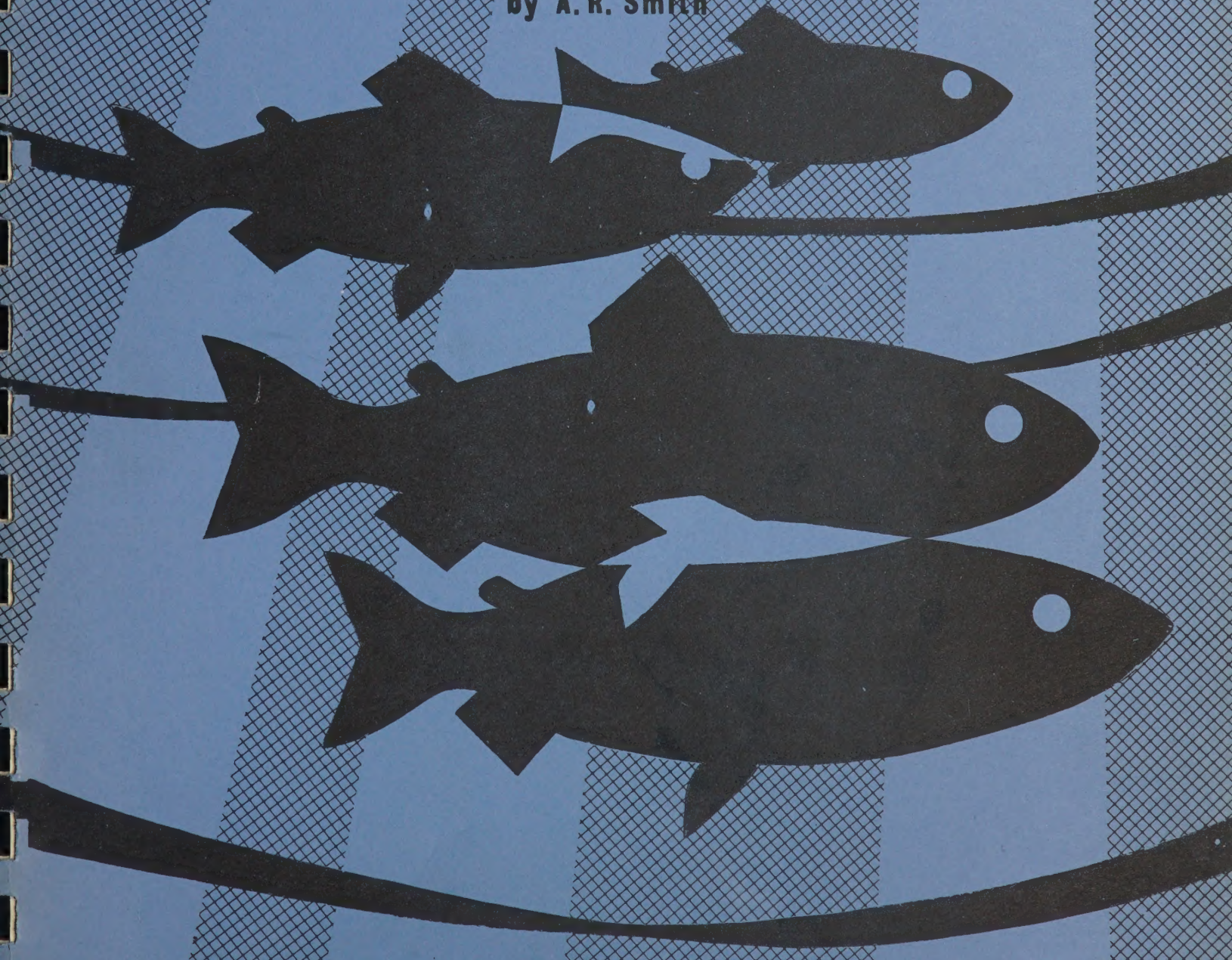
A Preliminary Biological Survey of Five Lakes in the Buffalo Head Hills

by A. R. Smith



Survey Report No. 10
Alberta Fish and Wildlife Division
FISHERIES SECTION

A PRELIMINARY BIOLOGICAL SURVEY OF FIVE LAKES IN THE BUFFALO HEAD HILLS

by

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Fish and Wildlife Division

Department of Lands and Forests

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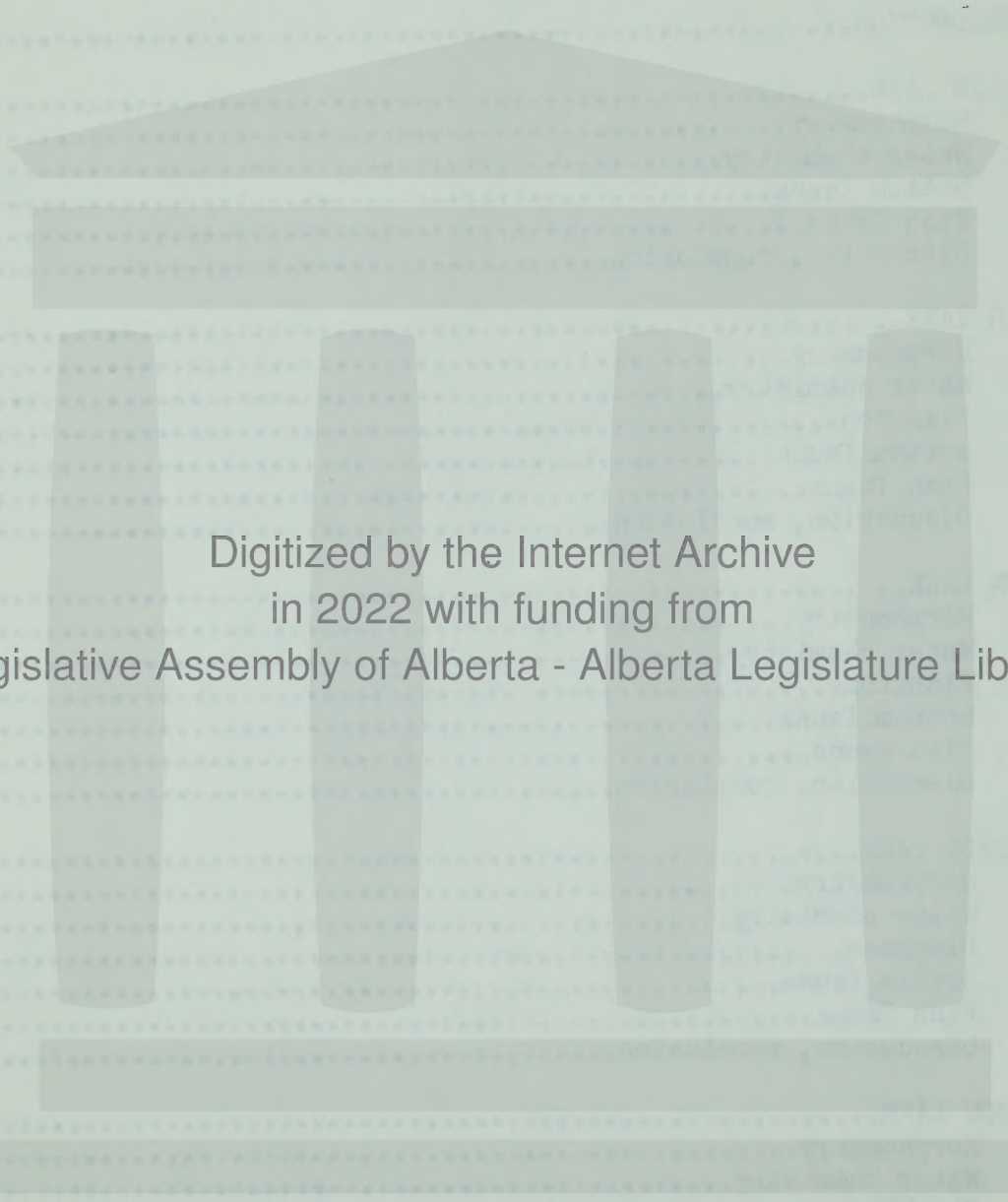

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INTRODUCTION

In the summer of 1969, a survey was carried out to assess the fisheries potential of lakes in the Buffalo Head Hills region. The Buffalo Head Hills lie about 70 miles north of the western tip of Lesser Slave Lake, between the Peace and Wabasca Rivers, and occupy most of the territory enclosed by latitudes 56° 37' N and 58° 00' N and longitudes 115° 34' W and 116° 57' W. The hills are higher than 2,000 feet above m.s.l. and cover an area of approximately 3,040 square miles (Fig. A). The region is drained by numerous tributaries of the Peace and Wabasca Rivers.

The bedrock geology of the area consists of sandstone and shale. The soil is classified as a grey wooded podzol mixed with peat, and supports typical boreal forest vegetation.

The climate of the region is subarctic and although a mean annual maximum temperature of 90°F is reported, an average of 70 days, only, of each year are frost free. Average total annual precipitation is 15 inches. Average yearly snowfall is 50 inches; however, the mean annual maximum snow depth does not exceed 25 inches and the region features a measurable snow cover for an average of 150 days per year. The prevailing winds blow from the west in summer and from the W.N.W. in winter.*

* Atlas of Canada, 1957. Department of Mines and Technical Surveys, Geographical Branch, Ottawa, Canada.

The nearest settlement is Carcajou, on the Peace River. The area is accessible by wheeled vehicle from Peace River or Fort Vermilion during the summer months, if conditions are suitable. During the winter, access with snow vehicles should not present any unusual problems.

Prior to the survey, the area was examined from an aircraft and Wadlin, Haig, Sawn, Russell, and Talbot Lakes were selected for further investigation. Both of the Otter Lakes and Bison Lake were noted as being quite shallow and very eutrophic; consequently they were omitted from the survey.

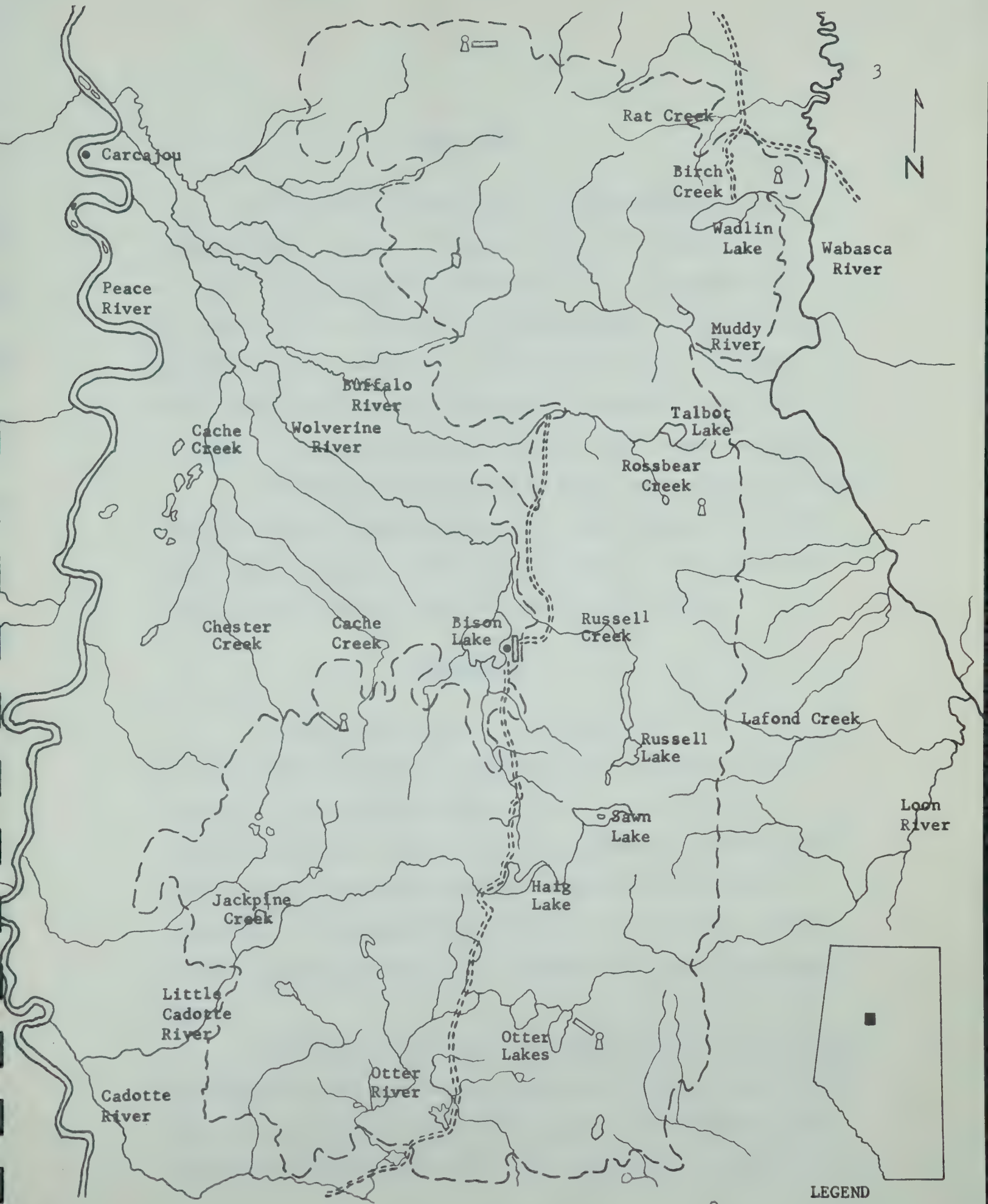


FIGURE A. MAP OF THE BUFFALO HEAD HILLS REGION
Scale: 1 inch = 10 miles

WADLIN LAKE

Wadlin Lake is about 48 miles south-southeast of Fort Vermilion and is located in Townships 100 and 101, Ranges 10 and 11, west of the 5th meridian (latitude 57° 45' N, longitude 115° 35' W). This lake is at an altitude of approximately 2,300 feet and is drained by a small creek which flows eastward to join the Wabasca River. Wadlin Lake has not been opened to commercial fishing at anytime and thus no previous catch record or cyst counts are available.

The lake was surveyed from 25 May to 3 June, 1969. The survey crew and necessary equipment were flown in by floatplane. Although Wadlin Lake is linked to Fort Vermilion by road, access at the time of survey would have been quite difficult by this route.

Morphometry

The dimensions of Wadlin Lake were obtained from a 1:27,372 map. The area (2,928 acres) was measured with a planimeter and the shoreline (11.66 miles) was determined with a mileage wheel. A shoreline development factor of 1.54 was calculated, indicating that the lake has a fairly regular shoreline (uninterrupted by bays or peninsulas). The maximum effective length is 4.86 miles in a W.S.W. direction, almost parallel to the direction of the prevailing summer winds.

Since the echo sounder was inoperative at the time of survey, soundings were taken by means of a hand line. The data thus obtained were used to construct a contour map (Fig. 1). The volume was then calculated as 62,394 acre feet, giving a mean depth of 21 feet. The

maximum depth encountered was 39 feet.

Dredgings revealed that the lake bottom consisted largely of muck, although much of the shoreline was rocky. At the time of the survey the water level of the lake was high and much of the normal shore area was submerged. When the water is at the normal summer level, the lake is said to feature an extensive sand beach. Aquatic vegetation was quite scarce and was limited to the extreme east end of the lake.

The outlet stream is located at the east end of the lake and it flows into the Wabasca River. The main channel is about 30 feet wide and braids into numerous sub-channels. The bottom is of mud and the greatest depth noted was 3 feet. The outlet deteriorated into a large marsh about 100 yards from the lake. As the fisheries potential for this stream appeared to be nil, no biological station was set up.

Wadlin Lake is located in a valley, the sides of which support a mixed-wood forest. Black spruce, balsam poplar, and balsam fir are dominant in the low areas while white spruce, aspen, and paper birch are dominant on the ridges and uplands. The lake is surrounded by a fringe of willows; however, at the time of survey this area was flooded. No wildlife other than red squirrels and varying hares were noted.

Water Chemistry

A single limnology station was set up on 31 May, 1969 in 31 feet of water (Fig. 2). The weather was clear with a slight breeze, and the air temperature was 11°C. The transparency rating was 6 feet. Water temperatures ranged from 9.5°C at the surface to 7.5°C at the bottom. Dissolved oxygen was determined with a Hach kit; a Beckman conductivity meter was used to calculate the concentration of total

dissolved solids, and a Hellige comparator was used to determine pH.

The dissolved oxygen readings were 10 ppm. at the surface and 9 ppm. at the bottom, while pH was 7.6 at the surface and 7.5 at the bottom. A total dissolved solids reading was taken at the surface only, and was 118 ppm. A dredging, taken at the site, showed that the bottom consisted of muck. The complete water analysis results are shown in Table II. A plankton haul was taken at the station, however the sample was destroyed in transit to Edmonton.

Bottom Fauna

Eight dredgings were taken with a 6" x 6" Ekman dredge to obtain bottom fauna (Fig. 2). Bottom samples were washed through a screen bottom bucket (25 meshes per inch) and all living organisms were picked out and preserved for later analysis. Of the groups taken, (Table III) chironomids were dominant both in volume and in numbers.

Fish Fauna

Eight 50 yard nets were set in Wadlin Lake and mesh sizes varied between sets (Table IV). The species taken included lake whitefish (*Coregonus clupeaformis*), northern pike (*Esox lucius*), yellow perch (*Perca flavescens*), and longnose sucker (*Catostomus catostomus*). No seining or sampling with rotenone was carried out during the survey. Some angling was done and 10 northern pike were taken in approximately eight angler hours. The largest fish taken weighed 9 pounds.

Lake whitefish

Forty-eight lake whitefish were netted and examined (Table V). Lengths, weights, and sexual maturity were recorded, while scale samples were taken for aging. Specimens ranged in age from 3 to 9 years, and weights varied from 160 to 940 grams (Fig. 4). Forty fish were examined for cysts of Triaenophorus crassus. Only a single fish was infected with three cysts, giving an infestation rate of 5.7 cysts per 100 pounds of fish.

The whitefish appeared to be maturing at 4 years of age. Although they were somewhat small, the almost complete absence of Triaenophorus could give them a reasonable commercial value.

Northern pike

Eleven northern pike were netted and examined (Table VI). Although no trophy size pike were taken, the fish were of reasonable size.

Yellow perch

Thirty-three yellow perch were examined and the results are given on Table VII. These fish were quite small and appeared to be very slow growing.

Longnose sucker

Of the 35 suckers taken, 28 were examined. The results are shown by Table VIII.

Discussion and Conclusion

Although Wadlin Lake is not opened for commercial fishing, it is used to some extent as a recreational fishery when surface access is feasible. If Ryder's estimation formula is applied, an annual production figure of 4.7 pounds of fish per acre can be calculated. This estimate appears somewhat large and a production figure of 3.5 pounds per acre would seem to be more realistic. Of the total 10,000 pounds thus produced, approximately 4,000 pounds should be of whitefish.

Wadlin Lake has a good potential for a recreational fishery, as it is accessible by road and is fairly close to the towns of Fort Vermilion and High Level.

TABLE I. Morphometry of Wadlin Lake. (Soundings were taken with a hand line during May-June, 1969). Other data were taken from 1:27,372 contour maps.

LOCATION: Tp. 101, R. 10, W. 5

AREA: 4.5754 sq. mi. (2,928 acres)

VOLUME: 62,394.04 acre feet

SHORELINE: 11.664 miles

SHORELINE DEVELOPMENT FACTOR: 1.539

MAXIMUM LENGTH: 4.86 miles

MAXIMUM EFFECTIVE LENGTH: 4.86 miles

MAXIMUM WIDTH: 1.2 miles

MAXIMUM EFFECTIVE WIDTH: 1.2 miles

MEAN DEPTH: 21.3 feet

MAXIMUM DEPTH: 39 feet

MEAN WIDTH: .9414 miles

DEPTH DISTRIBUTION:

	Acres	% Surface Area
Surface Area	2,928.00	100
10 feet plus	2,146.05	73.3
20 feet plus	1,680.26	57.4
30 feet plus	1,242.88	47.4
35 feet plus	196.99	6.72

TABLE II. Water Chemistry, Wadlin Lake. Sample 1 was taken at the surface and sample 2 at 31 feet.

Sample No.	1	2
Date	30-V-69	30-V-69
Depth (feet)	Surface	31
Temperature (^{o}C)	9	7.5
Dissolved oxygen (ppm)	10	9
Phenolphthalein alkalinity (ppm $CaCO_3$)		
Total alkalinity	240*	240*
Calcium hardness (ppm $CaCO_3$)	56*	56*
Total hardness	72*	72*
pH	7.6	7.5
Total dissolved solids (ppm)	118	-

*Analysis techniques questionable.

TABLE III. Bottom fauna analysis of Wadlin Lake. A total of 8 - $\frac{1}{4}$ sq. ft. dredgings were taken from May 31 - June 1, 1969. The following figures are standardized to square meters.

Organisms	No./m^2	% Total No.	% Total Volume
Chironomidae	2,217	89.9	98
Oligochaeta	188	7.6	-
Hirudinea	5	.2	-
Pelecypoda	54	2.2	-
TOTALS	2,464	99.9	

TABLE IV. Summarized catch record for Wadlin Lake, May, 1969.

Date Set & Pulled	Set No.	Mesh Size	Set Length	Set Depth (ft.)	Lake whitefish	Northern pike	Yellow perch	Longnose sucker	Total
29-29-V-69	1	2½	50 yds	10	2	3	1	2	8
29-30-V-69	2	4½	50 yds	10	3	0	0	0	3
29-30-V-69	2	2½	50 yds	10	8	2	9	1	20
30-31-V-69	3	3½	50 yds	5	24	1	0	12	37
30-31-V-69	3	2½	50 yds	5	11	2	0	13	26
30-31-V-69	4	1½	50 yds	4	0	0	25	0	25
2-2-VI-69	5	3½	50 yds	3	7	3	0	7	17
2-2-VI-69	6	5½	50 yds	16	0	0	0	0	0
TOTALS					55	11	35	35	136

TABLE V. Lake whitefish from Wadlin Lake, May, 1969.

Age Class	Sample Size	% of Sample	$\bar{x}$ fork length (range) mm.	$\bar{x}$ weight (range) gms.	% Female
III	3	6.3	262 (254-279)	177 (160-200)	33.3
IV	10	20.8	309 (279-356)	351 (240-590)	50.0
V	6	12.5	336 (305-381)	479 (284-770)	50.0
VI	12	25.0	394 (330-445)	693 (440-900)	50.0
VII	13	27.1	392 (305-432)	673 (340-810)	61.5
VIII	1	2.1	406	840	0.0
IX	3	6.3	441 (432-445)	880 (760-940)	33.3

TABLE VI. Northern pike from Wadlin Lake, May, 1969.

Age Class	Sample Size	% of Sample	$\bar{x}$ fork length (range) mm.	$\bar{x}$ weight (range) gms.	% Female
III	1	9.1	410	454	0.0
IV	2	18.2	497 (483-510)	824 (740-907)	50.0
V	4	36.4	575 (508-724)	1357 (900-2600)	75.0
VI	2	18.2	712 (673-750)	2600 (2120-3080)	50.0
IX	2	18.2	820 (762-877)	3765 (3190-4340)	50.0

TABLE VII. Yellow perch from Wadlin Lake, May, 1969.

Age Class	Sample Size	% of Sample	$\bar{x}$ fork length (range) mm.	$\bar{x}$ weight (range) gms.	% Female
I	1	3.0	191	80	100.0
IV	12	36.4	163 (140-216)	48 (28-130)	16.5
V	11	33.3	179 (152-231)	66 (35-160)	27.3
VI	6	18.2	202 (178-234)	99 (57-160)	66.7
VII	2	6.1	204 (178-229)	99 (38-160)	50.0
VIII	1	3.0	229	140	100.0

TABLE VIII. Longnose sucker from Wadlin Lake, May, 1969.

Age Class	Sample Size	% of Sample	$\bar{x}$ fork length (range) mm.	$\bar{x}$ weight (range) gms.	% Female
III	3	10.7	323 (318-330)	422 (411-454)	0.0
IV	11	39.3	329 (305-369)	457 (340-640)	54.6
V	14	50.0	339 (318-356)	514 (410-640)	50.0

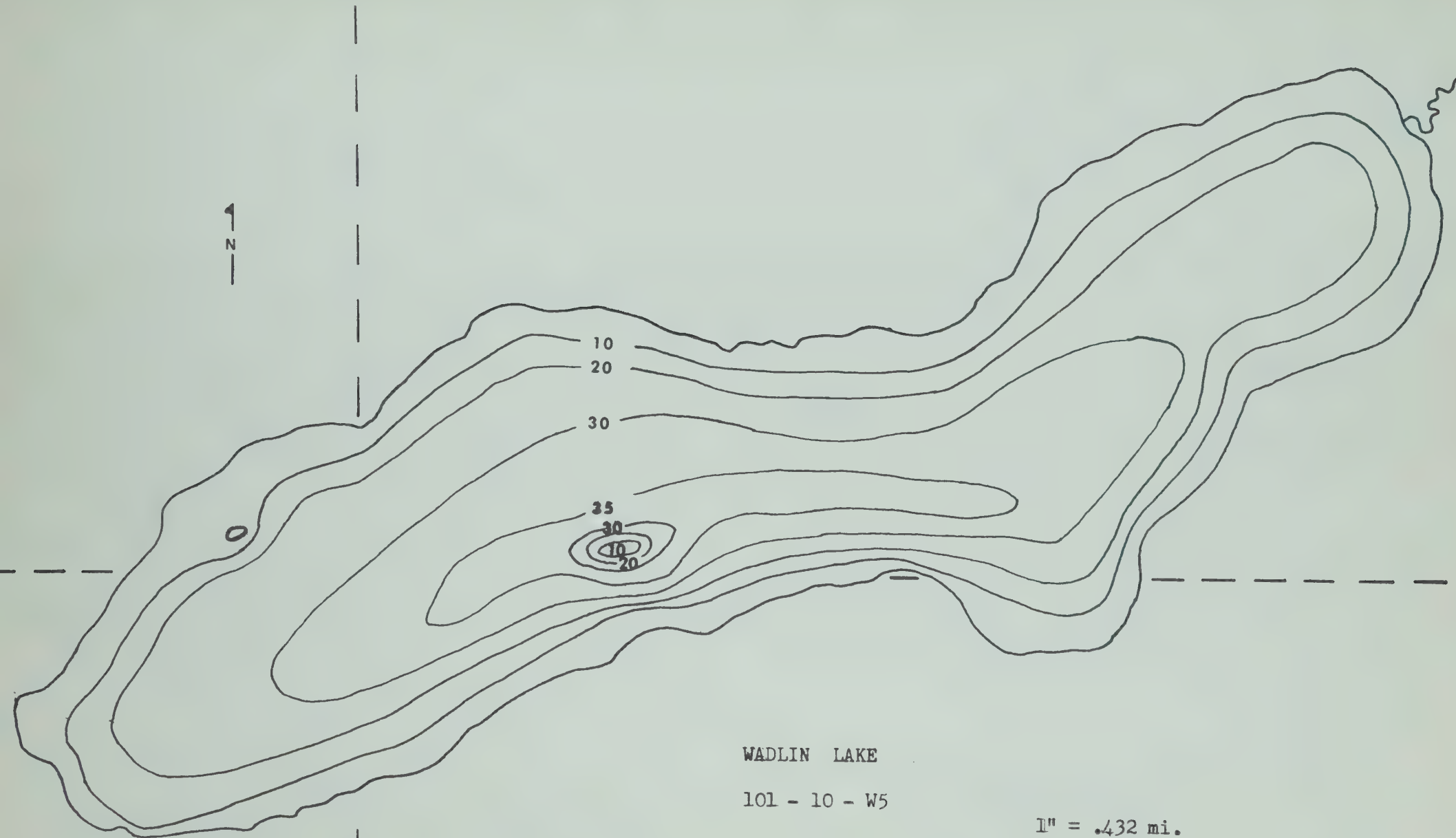


Fig. 1. Bottom contours of Wadlin Lake. Depths in feet. Map constructed from data obtained during survey.

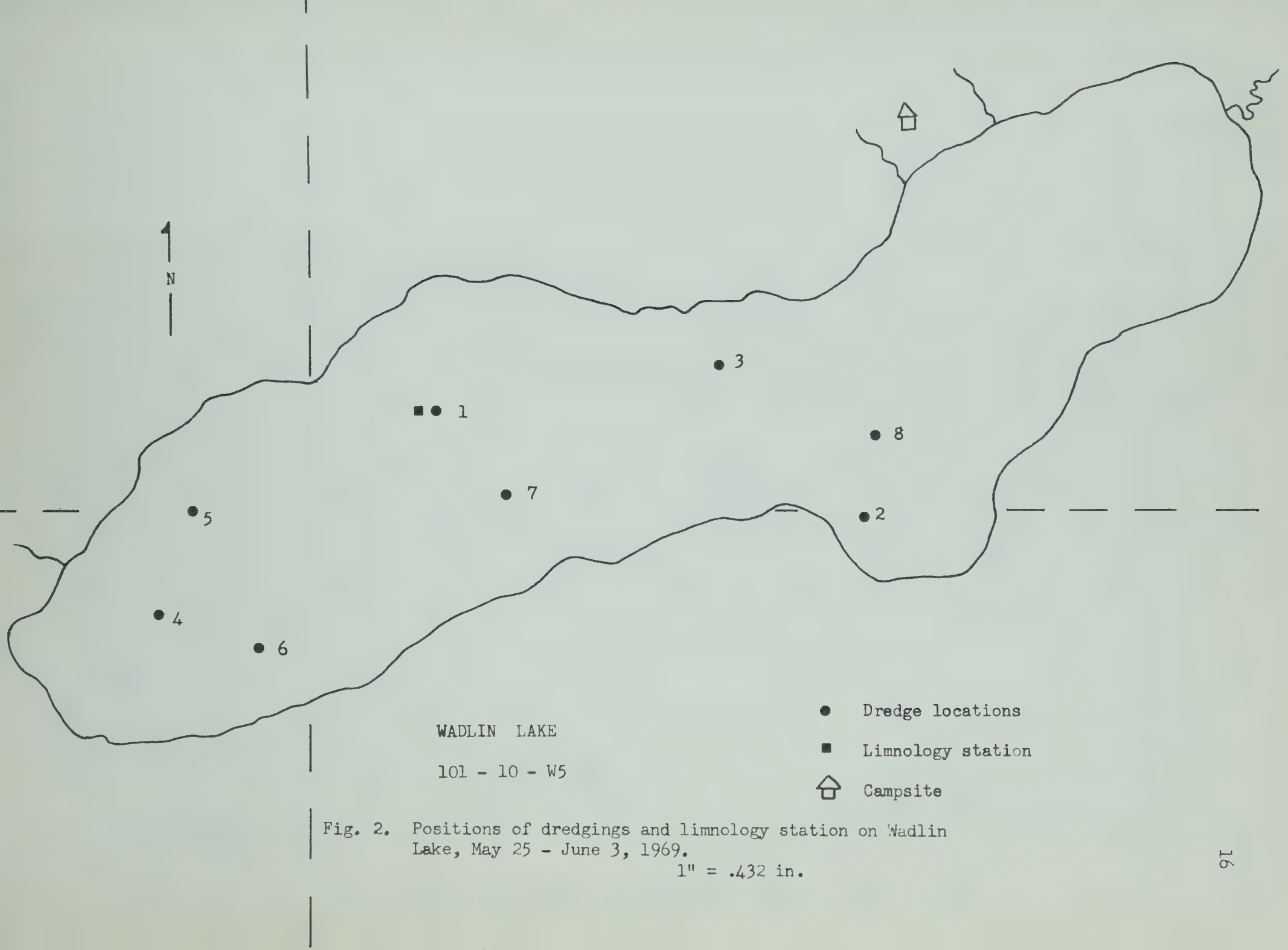


Fig. 2. Positions of dredgings and limnology station on Wadlin Lake, May 25 - June 3, 1969.

1" = .432 in.

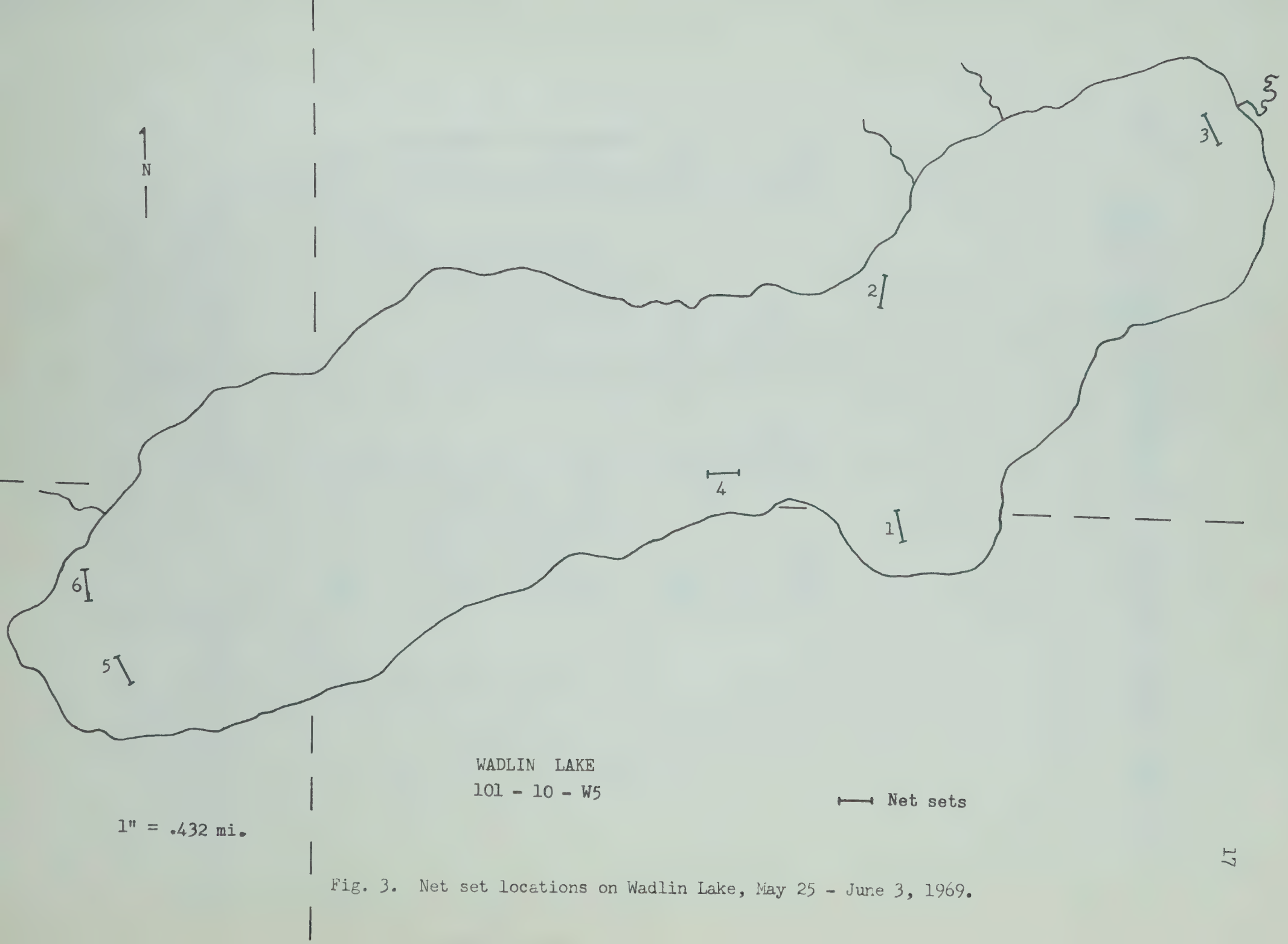


Fig. 3. Net set locations on Wadlin Lake, May 25 - June 3, 1969.

Figure 4. Lake whitefish from Wadlin Lake. The figures show the ranges and means of fork lengths and weights from each age class. Sample sizes are indicated.

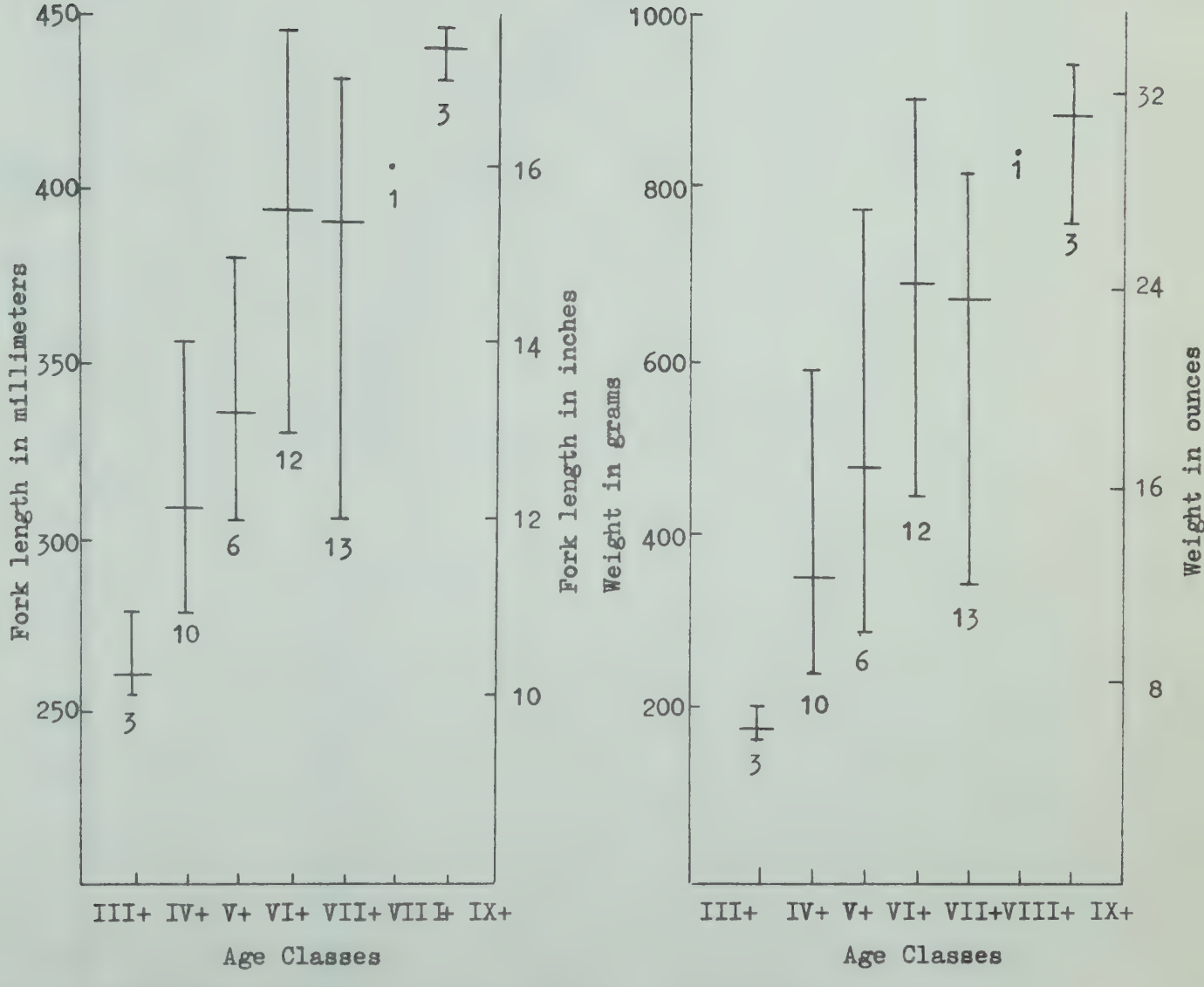
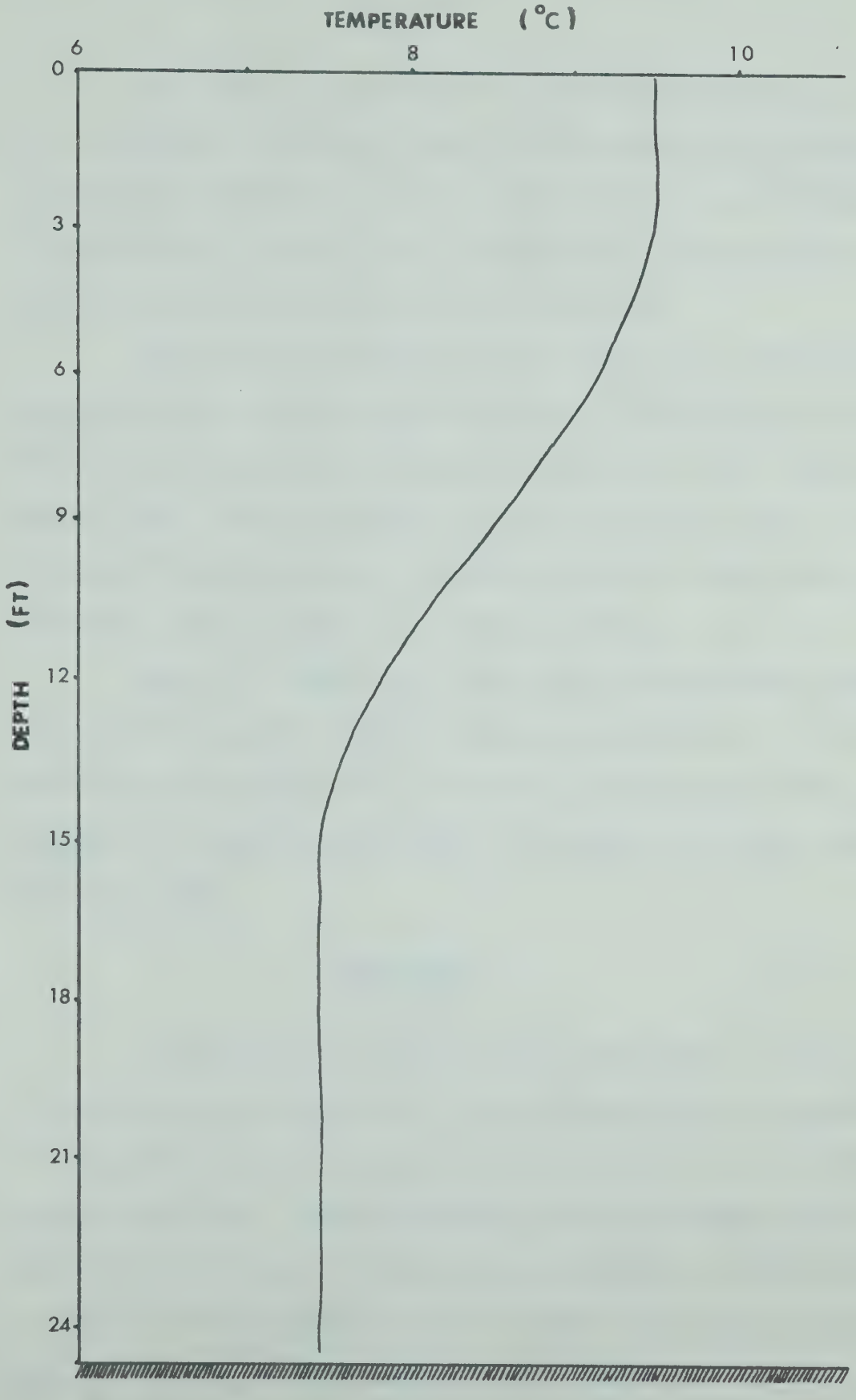


Fig. 5. Thermal profile of Wadlin Lake, May 31, 1969.



HAIG LAKE

Haig Lake is situated about 65 air miles northeast of Peace River in Township 91, Range 13, west of the 5th meridian (latitude 56° 55' N and longitude 116° 05' W). The lake lies at an altitude of approximately 2,375 feet and is drained by the Little Cadotte River, which is a secondary tributary to the Peace River.

Haig Lake has been commercially fished since 1956 (Table IX). Fishing was carried out annually from 1956 to 1962, after which the fishery was interrupted for five years; fishing was then continued in 1967 and 1968. With the exception of the 1967 season, almost all of the fish taken from Haig Lake were whitefish, and annual catch sizes ranged from 83,000 pounds in 1961 to 150 pounds in 1968.

There is a road between Haig Lake and Peace River; however, it is passable only when weather conditions are suitable. For this reason, men and equipment were flown in by floatplane and survey techniques were modified accordingly. Haig Lake was surveyed from 12-16 July, 1969.

Morphometry

The dimensions of Haig Lake were taken from a 1:31,680 map and the surface area (2,198 acres) was determined with a planimeter. The shoreline is 21.6 miles long and the resultant shoreline development factor is 3.28. The shallowness of the lake (maximum depth 32 feet) and the high value of the shoreline development factor reveals that much of the lake bottom is in the euphotic zone (depth distribution, Table I). This is an indication of high productivity.

The maximum effective length is 3.15 miles in a west-southwest direction, almost parallel to the direction of the prevailing summer winds. As a result, wind action seems to be sufficient to cause complete mixing.

Depths were determined with a Furuno echo sounder and contour map was prepared from the data (Fig. 1). The volume of the lake was calculated to be 24,490 acre feet, resulting in a mean depth of 11.7 feet.

The bottom of the lake appeared to consist primarily of mud, although much of the shoreline and the shallows at the western end were gravel. Two beaches occur at opposite ends of this lake. The one on the western shore is gravel mixed with sand, while the one on the eastern shore is of sand only and is just east of the small island (Fig. 1). Aquatic vegetation was abundant at the mouths of the inlets and outlet streams. Both emergents and patches of floating submergents occurred in a thin belt around the lakeshore.

Haig Lake is bordered by low rolling hills on the north, east and south sides, while the western edge is open to wind action. Black spruce is dominant in much of the surrounding area; however, large stands of poplar occurred around the lake and for some distance along the western edge. Willow was quite common along the shoreline and at the outlet. Wildlife encountered included loons, terns, ducks (largely mallard and scaup), ruffed grouse, and a single eagle.

Water Chemistry

A single limnology station was set up at Haig Lake on 16 July, 1969. The weather was very cloudy, with a westerly breeze, and the air temperature was 14.2°C. The depth at the station site

was 23 feet and the bottom was composed of muck. The transparency rating was 4.5 feet. The water temperature was almost uniform, being 15°C at the surface and 14.7°C at the bottom.

Dissolved oxygen was 9 ppm. at the surface and 8 ppm. at the bottom. The pH was 8.6 at the surface and 8.4 at the bottom. As a conductivity meter was not available at this time, no T.D.S. readings were obtained. A Hellige pocket comparator was used to determine pH, while a Hach kit was used for testing dissolved oxygen, alkalinity, and hardness. The results of the analysis are shown in Table II.

Plankton

A single plankton haul was taken vertically from a depth of 20 feet at the limnology station. A Wisconsin-type plankton net with # 20 mesh silk and a mouth diameter of 20 cms. was used to take the sample.

Despite the occurrence of a 'bloom' of Ceratium (Pyrrophyta) a large number of other algal species were quite abundant (Table III). Zooplankton was limited to rotifers, cladocerans, and copepods, all of which were fairly common. An approximate volume of 3.30 ml. was calculated for the sample; this was done by taking a 40 ml. aliquot from a well-stirred sample and centrifuging it for 20 minutes at 2,000 rpm.

Bottom fauna

Nineteen bottom samples, each one quarter of a square foot in area, were taken with an Ekman dredge (Fig. 2). Most of the lake bottom consisted of muck, although occasionally deposits of sand and gravel were encountered. Samples were washed through a screen bottom

bucket (25 meshes per inch) and all living organisms were picked out and preserved for later analysis.

Chironomids were by far the largest group, both in numbers and in volume. By volume, all of the other groups were insignificant; however both pelecypods and oligochaetes were taken in reasonable numbers (Table IV). The standing crop of bottom fauna was calculated as being 697 organisms per square meter with a volume displacement of 3 mls.

Fish fauna

A single 12-hour net set was made at the location shown in Figure 2. Mesh sizes used were $2\frac{1}{2}$", $3\frac{1}{2}$", $4\frac{1}{2}$", and $5\frac{1}{2}$" stretch measure with 50 yards of each size being used in the gang. Table V shows the number of each species of fish caught in each net. Fish taken at Haig Lake included; lake whitefish (Coregonus clupeaformis), northern pike (Esox lucius), burbot (Lota lota), and white sucker (Catostomus commersoni). Several seine hauls were attempted; however these yielded nothing but a few very small pike.

Lake whitefish

One hundred and eighteen lake whitefish were netted and of these 36 were examined. Lengths, weights, and sexual maturity were recorded and scale samples were taken for age determination. The data thus obtained are summarized in Table VI and in Figures 3 and 4.

The fish were somewhat undersized and appear to mature fairly rapidly, between 3 and 4 years of age. Thirty whitefish were examined for plerocercoids of Triaenophorus crassus and 25 were found to be infected. The total weight of the fish examined was 54 pounds, giving

an infestation rate of 250 cysts per 100 pounds of fish. Rates of infestation obtained from previous counts are presented in Table XI.

Northern pike

Seven northern pike were taken and examined during the survey. These fish were all fairly small, the largest weighing only 1,610 grams (3.5 pounds). The results are shown in Table VIII.

Discussion and Conclusion

Haig Lake has only limited value as a commercial fishery owing to the heavy infestation of Triaenophorus in the whitefish. The pike are too small to be of any trophy value but should provide some recreational fishing. As mentioned earlier, Haig Lake is linked to the Peace River by road and it is already being used as a recreational fishery when road conditions are favorable.

TABLE I. Morphometry of Haig Lake. (Soundings were taken with a Furuno echo sounder during July, 1969). Other data were taken from maps at a scale of two inches to one mile.

LOCATION: Tp. 91, R. 13, W. 5

AREA: 3.435 sq. mi. (2,198 acres)

VOLUME: 24,490 acre feet

SHORELINE: 21.6 miles

SHORELINE DEVELOPMENT FACTOR: 3.28

MAXIMUM LENGTH: 3.15 miles

MAXIMUM EFFECTIVE LENGTH: 3.15 miles

MAXIMUM WIDTH: 1.70 miles

MAXIMUM EFFECTIVE WIDTH: 1.35 miles

MEAN WIDTH: 1 mile

MAXIMUM DEPTH: 32 feet

MEAN DEPTH: 11.7 feet

DEPTH DISTRIBUTION:

	Acres	% Surface Area
Surface Area	2,198	100
5 feet plus	1,562	71
10 feet plus	1,158	53
15 feet plus	723	33
20 feet plus	323	15
25 feet plus	70	3
30 feet plus	13	0.5

TABLE II. Water Chemistry, Haig Lake. Sample 1 was taken at the surface and sample 2 at 23 feet.

Sample No.	1	2
Date	16-VII-69	16-VII-69
Depth (feet)	surface	23
Temperature (°C)	15	14.75
Dissolved oxygen (ppm)	9	8
Phenolphthalein alkalinity (ppm $CaCO_3$)	nil	nil
Total alkalinity	245	127
Calcium hardness (ppm $CaCO_3$)	90	80
Total hardness (ppm)	125	120
pH	8.6	8.4
Total dissolved solids	*	*

* Could not be measured.

TABLE III. Plankton sample, Haig Lake, July 16, 1969. The sample consisted of a 20 foot vertical haul using a Wisconsin plankton net with number 20 mesh silk and a mouth diameter of 20 cms.

Group	Relative Abundance*
A. Phytoplankton	
Cyanophyta	
Anabaena	2
Microcystis	1
Nostoc	3
Chlorophyta	
Pediastrum	tr.
Staurastrum	tr.
Ulothrix	4
Chrysophyta	
Asterionella	4
Fragilaria	4
Tabellaria	4
Stephanodiscus	4
Pyrrhophyta	
Ceratium	blm.
B. Zooplankton	
Rotifera	
Rotifers	2
Arthropoda	
Copepods	2
Cladocerans	2
Volume of Sample	3.300 ml.

(Calculated by centrifuging 40 ml. aliquot @ 2,000 rpm for 20 min.)

* Relative Abundance Scale: trace, 1, 2, 3, 4, 5, bloom.

TABLE IV. Bottom fauna analysis, Haig Lake. A total of 18-¼ sq. ft. dredgings were taken. The following figures are standardized to square meters.

Organisms	No./m^2	% Total No.	Volume/m^2 (mls.)	% Total Volume
Chironomids	452	65	3	99
Oligochaeta	55	8	-	-
Hirudinea	10	-	-	-
Pelecypoda	170	24	-	-
Gastropoda	10	-	-	-
TOTALS	697		3	

TABLE V. Summarized catch record for Haig Lake, July, 1969.

Date Set & Pulled	Set No.	Mesh Size	Set Length	Set Depth (ft.)	Lake whitefish	Northern pike	Burbot	White sucker	Total
13-14-VII-69	1	2½	50 yds	20	12	3	2	1	18
13-14-VII-69	1	3½	50 yds	20	35	4	0	4	43
13-14-VII-69	1	4½	50 yds	20	49	0	0	7	56
13-14-VII-69	1	5½	50 yds	20	22	0	0	0	22
TOTALS					118	7	2	12	139

TABLE VI. Lake whitefish from Haig Lake, July, 1969.

Age Class	Sample Size	% of Sample	$\bar{x}$ fork length (range) mm.	$\bar{x}$ weight (range) gms.	% Female
III	8	22.2	309 (240-408)	346 (200-406)	36.3
IV	2	5.6	325 (324-326)	450 (440-460)	0.0
V	1	2.8	420	1080	0.0
VI	12	33.3	389 (362-428)	813 (670-990)	87.7
VII	5	13.9	393 (374-418)	852 (710-1020)	20.0
VIII	5	13.9	447 (382-619)	926 (780-1120)	20.0
IX	2	5.6	415 (404-425)	1040 (1000-1080)	50.0
X	1	2.8	463	1000	100.0

TABLE VII. White sucker from Haig Lake, July, 1969.

Age Class	Sample Size	% of Sample	$\bar{x}$ fork length (range) mm.	$\bar{x}$ weight (range) gms.	% Female
V	4	33.3	378 (344-403)	793 (560-1050)	50.0
VI	5	41.7	397 (365-419)	940 (730-1040)	80.0
VII	2	16.7	412 (396-427)	1020 (970-1070)	100.0
VIII	1	8.3	422	1030	100.0

TABLE VIII. Northern pike from Haig Lake, July, 1969.

Age Class	Sample Size	% of Sample	$\bar{x}$ fork length (range) mm.	$\bar{x}$ weight (range) gms.	% Female
IV	5	71.4	565 (475-631)	1126 (750-1610)	80.0
V	2	28.6	556 (546-565)	1005 (910-1100)	100.0

TABLE IX. Burbot from Haig Lake, July, 1969.

Age Class	Sample Size	% of Sample	$\bar{x}$ fork length (range) mm.	$\bar{x}$ weight (range) gms.	% Female
VII	2	100.0	580 (575-585)	1235 (1230-1240)	50.0

TABLE X. Commercial fishing record, Haig Lake.

Year	Lic.	Ling	Suckers	Pike	Whitefish	Total
56/57	2				4,500	4,500
57/58	2				4,000	4,000
58/59	2				3,500	3,500
60/61	13			170	5,827	6,024
61/62	8				83,000	83,000
62/63	2				9,000	9,000
67/68	4			300	150	800
68/69	16	7,000	5,000	5,000	45,360	62,360

TABLE XI. Rates of infestation (R.O.I.) of *Triaenophorus crassus* in lake whitefish from Haig Lake.

Date	No. of fish examined	No. infected	Weight in pounds	No. of cysts	R.O.I. (cysts/100 lbs.)
22-XI-45	100	100	218.3	867	369.9
3-II-58	46	43	107.0	354	330.8
3-X-60	50	50	107.2	664	620.6
3-VIII-62	25	24	54.0	137	253.5
20-XI-64	49	46	109.6	255	231.0
14-VII-69	30	25	54.0	135	249.8

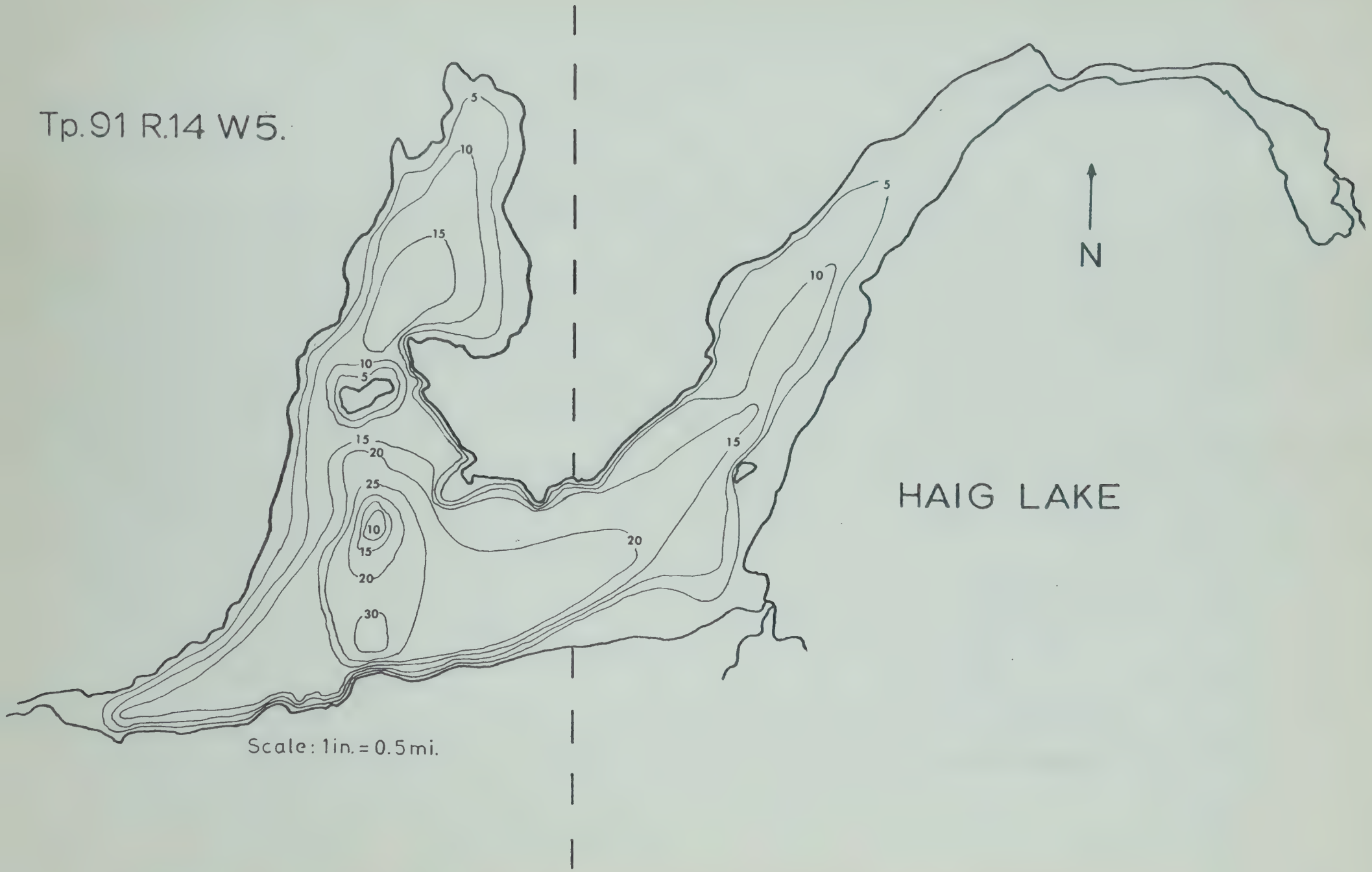


Figure 1. Bottom contours of Haig Lake. Depths in feet. Map constructed from data obtained during survey.

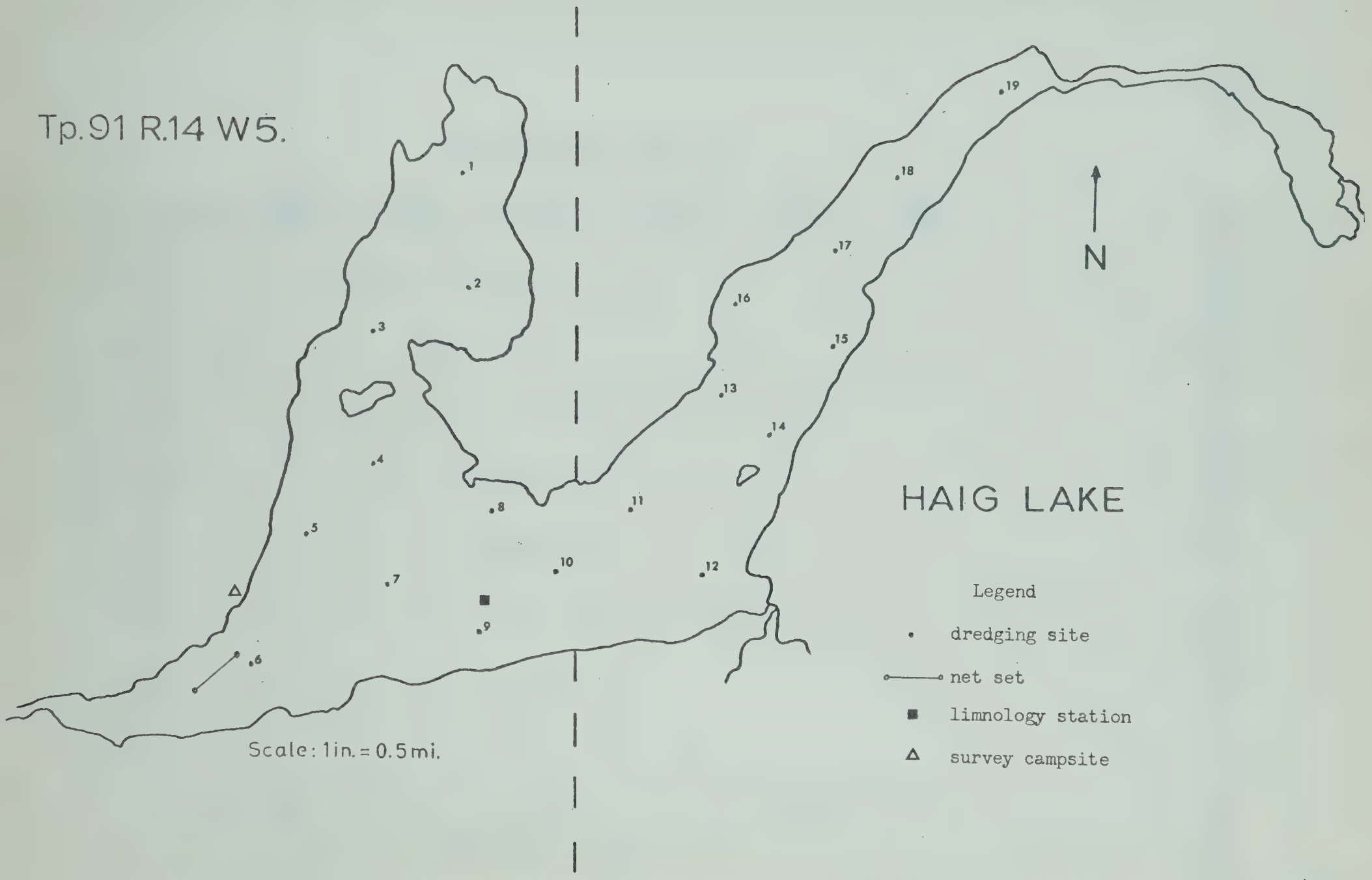


Figure 2. Location of dredging sites, net set, and limnology station on Haig Lake, July 12-16, 1969.

Figure 3. Lake whitefish from Haig Lake. The figures show the ranges and means of fork lengths for each age class. Sample sizes are indicated.

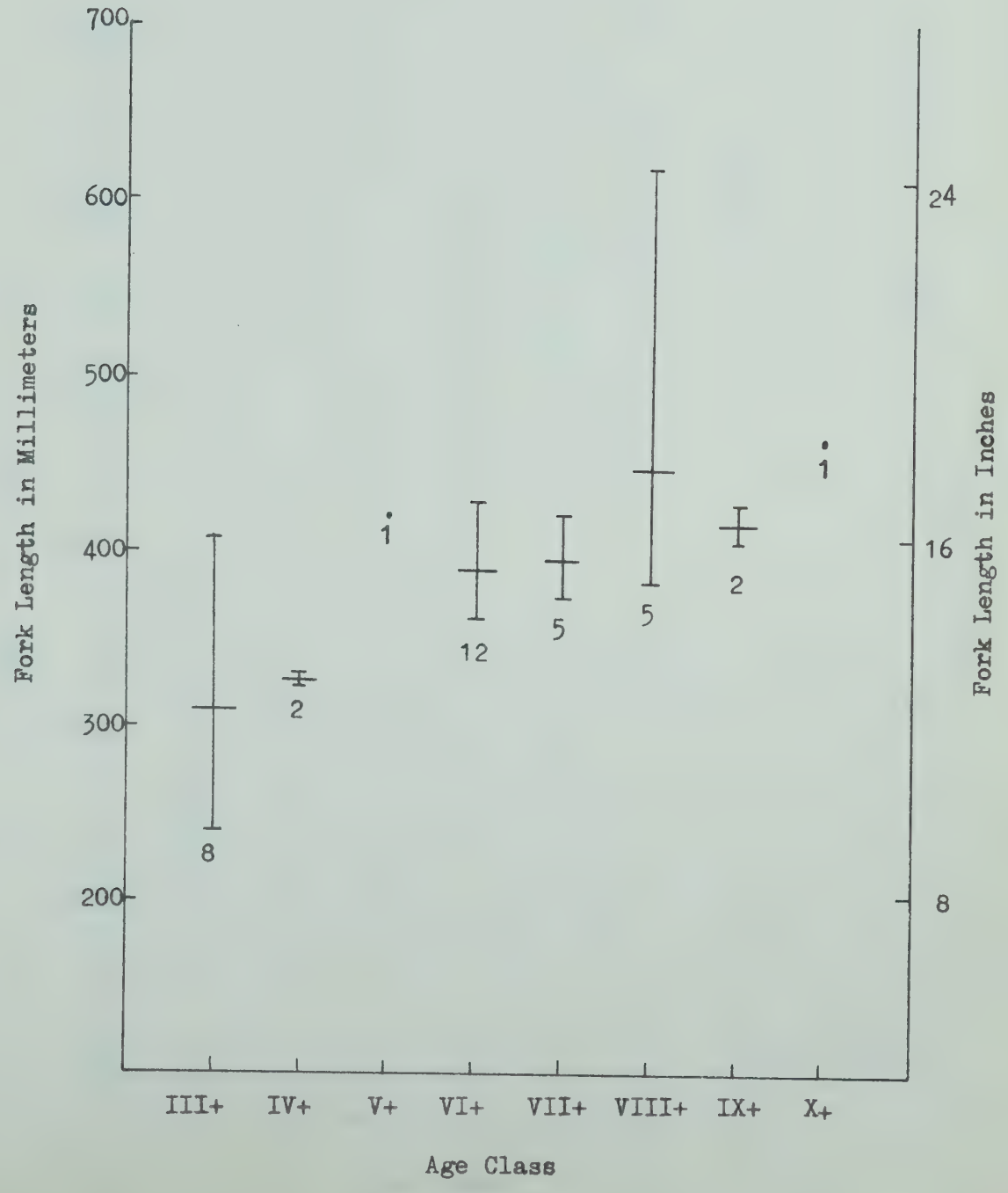
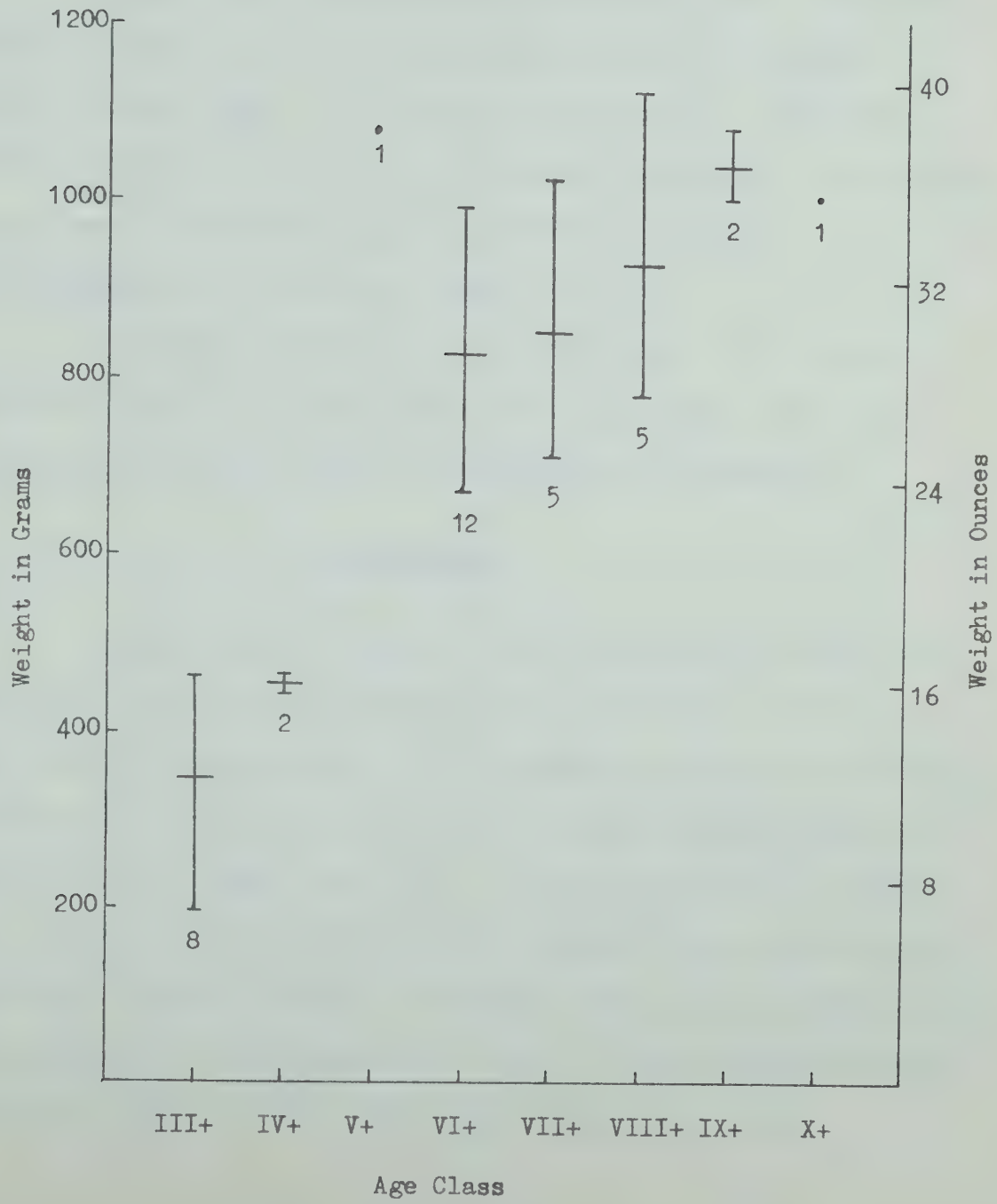


Figure 4. Lake whitefish from Haig Lake. The figures show the ranges and means of weights for each age class. Sample sizes are indicated.



SAWN LAKE

Sawn Lake is located about 72 miles northeast of Peace River in Township 92, Ranges 12 and 13, west of the 5th meridian (latitude 56° 59' N and longitude 115° 55' W). The lake is at an approximate altitude of 2,450 feet m.s.l. and it is drained by the Little Cadotte River which flows into Haig Lake (Fig. A, INTRODUCTION).

Unlike Wadlin and Haig Lakes, Sawn Lake is not accessible by road, although tracked vehicles could reach it by using any of several seismic lines. This lake has been opened for commercial fishing several times; however it has never been fished. The reported small size of the whitefish and the tremendous infestation of Triaenophorus have deterred any commercial efforts.

Sawn Lake was surveyed from 17-24 July, 1969. Men and equipment were flown in by a Cessna 180 equipped with floats and survey techniques were adapted to accommodate this situation.

Morphometry

Measurements of Sawn Lake were taken from a 1:31,680 map. The area of the lake is 4.8 square miles (3,082 acres) and it's shoreline is 19.45 miles long. This produces a shoreline development factor of 2.5, indicating that the lake has an irregular shape and that it could be fairly productive. The maximum effective length is 4.5 miles in a west-southwest direction, and the maximum effective width is 1.5 miles. Although the length of the lake is almost parallel to the direction of the prevailing winds, the water chemistry results (Table II) indicate that thermal stratification does occur.

The lake was sounded with a Furuno echo sounder and a contour map was constructed from the data obtained (Fig. 1). The volume of Sawn Lake was calculated to be 61,298 acre feet while the mean depth is about 20 feet. The deepest point recorded was 71 feet. As shown by the depth distribution chart in Table I, much of the lake's bottom area is at a depth of 20 feet or less. Most of the lake bottom below 20 feet consisted of a brown ooze; however in the shallows (20 feet or less), especially in the western end, the bottom was mostly of sand and gravel. Much of the shoreline, including the two large islands, features beaches of sand and/or gravel.

Aquatic vegetation was mostly of the submergent type and it occurred largely in the eastern end of the lake. Emergent vegetation was confined to the eastern end, the southwestern outlet, and a few scattered patches along the shoreline elsewhere.

Sawn Lake is in a shallow basin surrounded by low hills which are covered by thick forests of spruce and pine. Both the central and western islands are covered with trees, including spruce, dogwood, and birch. Much of the large central island is carpeted with a 6 inch growth of lichens. This suggests that the island forest of spruce is of considerable age.

The inlets and the outlet were examined for fisheries potential. The inlets are shallow, sluggish and weed choked. The outlet (the Little Cadotte River) appeared to have some good potential, as its initial rate of flow was fairly fast and much of the bottom was of gravel. A stream station was set up and a fish collection was made; however no game fish other than pike were taken.

Water Chemistry

Water samples number 1 and 2 were taken at the limnology station site during the evening of 23 July, 1969. The limnology station was conducted in 60 feet of water and a dredging showed that the bottom was of organic ooze. The air temperature was 20°C, while the weather was clear, with only a few cumulus clouds and a light breeze from the west. The transparency rating was 6.5 feet. Temperatures were taken every 5 feet with a thermistor and these ranged from 11.0°C at 60 feet to 16.5°C at the surface. As shown by the thermal profile (Fig. 5) some stratification appears to have occurred between 50 and 60 feet. Dissolved oxygen was 5 ppm. at the surface and 3 ppm. at the bottom, while the pH was 8.8 at the surface and 7.2 at 60 feet. The other analysis results are summarized in Table II.

Water sample number 3 was taken at a stream station on the outlet during 24 July, 1969. The water temperature was 18°C, dissolved oxygen was 10 ppm. and the pH was 8.8+. The remaining analysis results are shown in Table II.

In all cases a Hellige comparator was used to obtain pH while the other analysis results were determined using a Hach kit. A conductivity meter was not available at this time and consequently the amount of dissolved solids present could not be determined.

Plankton

A single vertical plankton haul was taken from a depth of 20 feet at the site of the limnology station (Fig. 2). A Wisconsin plankton net with # 20 mesh silk and a mouth diameter of 20 cms. was

used.

The species composition of the plankton haul was very similar to that of Haig Lake; however the relative numbers of individuals varied greatly. Although the numbers of Ceratium indicate that a bloom condition probably had occurred, the water at the time of survey was clear. Other algal species were also fairly abundant and their relative numbers are shown in Table III. Zooplankton was limited to rotifers and copepods, both of which were fairly common. An approximate displacement volume of 1.18 mls. was calculated for the plankton sample. This was determined by removing a 40 ml. aliquot from a well stirred sample and centrifuging it for 20 minutes at 2,000 rpm.

Bottom Fauna

Thirty bottom samples were taken, each consisting of a single 6" x 6" Ekman dredging taken from the locations shown in Figure 2. Samples were washed through a screen bottom bucket (25 meshes per inch) and all living organisms were picked out and preserved for later analysis. As mentioned earlier the most common type encountered in areas deeper than 20 feet was organic ooze, while sand and gravel were the most common in the shallower areas. The standing crop of bottom fauna was calculated to be 828 organisms per square meter. Chironomids were the most abundant group followed by amphipods and oligochaetes. The bottom fauna analysis results, which include several less significant groups, are shown in Table IV.

Fish Fauna

Three 12-hour net sets, varying in net length and mesh size,

were made during the survey (Table V). Species netted included lake whitefish (Coregonus clupeaformis), northern pike (Esox lucius), and white sucker (Catostomus commersoni). A seine haul taken on the west shore of the smaller island (Fig. 2) showed that Iowa darters (Etheostoma exile) were present. The origin of the Little Cadotte River was sampled with rotenone and burbot (Lota lota), perch (Perca flavescens), spottail shiner (Notropis hudsonius) and northern pike were taken.

Lake whitefish

One hundred and forty-four lake whitefish were netted and 30 of these were examined. Lengths, weights, and sexual maturity were recorded, while scale samples were taken for age determination. These fish were generally smaller than fish of the same year class in Haig Lake and appear to be maturing a year later (4-5 years). Growth rates are shown in Table VI and in Figures 3 and 4.

All of the 30 fish were examined for cysts of Triaenophorus crassus and 28 were found to be infected. In total, 47.36 pounds of fish were found to contain 138 cysts, producing an infestation rate of 291 cysts per 100 pounds of fish. Infestation rates from earlier counts are given in Table VIII.

Northern pike

A total of 18 northern pike were taken; however, only eight of these were examined (Table VII). None of the pike taken were of trophy size; the largest one weighed only 3.5 pounds.

Discussion and Conclusion

The poor quality and high infestation rate of the whitefish from Sawn Lake make them unattractive to the commercial fisherman. Since the only game fish encountered were small northern pike, the trophy potential for Sawn Lake appears slight. However, the lake does hold some promise as a recreational area. Its central and western shores feature numerous sand and gravel beaches and the water in these locations is suitable for swimming. Located in an area where suitable lakes are quite rare, Sawn Lake is within reasonable distance from Peace River, and is just 6 miles off the road from Haig Lake (Fig. A, INTRODUCTION). If a road is built into Sawn Lake, the feasibility of introducing walleye there should be considered.

TABLE I. Morphometry of Sawn Lake. (Soundings were taken with a Furuno echo sounder during June, 1969). Other data were taken from maps at a scale of two inches to one mile.

LOCATION: Tp. 92, R. 12, W. 5

AREA: 4.815 sq. mi. (3,082 acres)

VOLUME: 61,298 acre feet

SHORELINE: 19.45 miles

SHORELINE DEVELOPMENT FACTOR: 2.50

MAXIMUM LENGTH: 4.50 miles

MAXIMUM EFFECTIVE LENGTH: 4.50 miles

MAXIMUM WIDTH: 1.75 miles

MAXIMUM EFFECTIVE WIDTH: 1.50 miles

MEAN WIDTH: 1.07 miles

MAXIMUM DEPTH: 71 feet

MEAN DEPTH: 19.92 feet

DEPTH DISTRIBUTION:

	Acres	% Surface Area
Surface Area	3,082	100
5 feet plus	2,272	73.7
10 feet plus	1,846	59.9
20 feet plus	1,296	42
30 feet plus	710	23
40 feet plus	403	13.1
50 feet plus	288	9.3
60 feet plus	179	5.8
70 feet plus	26	0.8

TABLE II. Water chemistry, Sawn Lake. Samples 1 & 2 were taken at the site of the limnology station while sample 3 was taken at the origin of the Little Cadotte River.

Sample No.	1	2	3
Date	23-VII-69	23-VII-69	24-VIII-69
Depth (feet)	surface	60	surface
Temperature (^{o}C)	16.5	11	18
Dissolved oxygen (ppm)	5	3	10
Phenolphthalein alkalinity (ppm $CaCO_3$)	nil	nil	nil
Total alkalinity	225	215	205
Calcium hardness (ppm $CaCO_3$)	No reading	105	75
Total hardness (ppm)	110	100	100
pH	8.8	7.2	8.8+

TABLE III. Plankton sample, Sawn Lake, July 23, 1969. The sample consisted of a 20 foot vertical haul using a Wisconsin plankton net with number 20 mesh silk and a mouth diameter of 20 cms.

Group	Relative Abundance*
A. Phytoplankton	
Cyanophyta	
Anabaena	4
Microcystis	3
Nostoc	3
Chlorophyta	
Pediastrum	tr.
Staurastrum	3
Ulothrix	1
Chrysophyta	
Asterionella	3
Fragilaria	2
Tabellaria	2
Stephanodiscus	4
Pyrrhophyta	
Ceratium	blm.
B. Zooplankton	
Rotifera	
Rotifers	2
Arthropoda	
Copepods	2
Volume of Sample	1.18 ml.

(Calculated by centrifuging 40 ml. aliquot @ 2,000 rpm for 20 min.)

* Relative Abundance Scale: trace, 1, 2, 3, 4, 5, bloom.

TABLE IV. Bottom fauna analysis, Sawn Lake. A total of 29 - $\frac{1}{4}$ sq. ft. dredgings were taken on July 19, 1969. The following figures are standardized to square meters.

Organisms	No./m^2	% Total No.
Chironomids	452	55
Ephemeroptera	58	7
Trichoptera	20	2
Amphipoda	160	19
Oligochaeta	74	9
Hirudinea	3	
Pelecypoda	52	6
Gastropoda	9	
TOTALS	828	98

TABLE V. Summarized catch record for Sawn Lake, July, 1969.

Date Set & Pulled	Set No.	Mesh Size	Set Length	Set Depth (ft.)	Lake whitefish	Northern pike	White sucker	Total
19-20-VII-69	1	2½	50 yds	35	7	1	0	8
19-20-VII-69	1	3½	50 yds	35	9	3	0	12
19-20-VII-69	1	4½	50 yds	35	16	4	0	20
19-20-VII-69	1	5½	50 yds	35	1	0	0	1
19-20-VII-69	2	4½	50 yds	60	46	2	0	48
22-24-VII-69	2	5½	50 yds	60	57	1	0	58
24-25-VII-69	3	4½	50 yds	surface	6	7	3	16
24-25-VII-69	3	5½	50 yds	surface	2	0	1	3
TOTALS					144	18	4	166

TABLE VI. Lake whitefish from Sawn Lake, July, 1969.

Age Class	Sample Size	% of Sample	$\bar{x}$ fork length (range) mm.	$\bar{x}$ weight (range) gms.	% Female
IV	6	20.0	289 (255-325)	317 (220-420)	83.3
V	3	10.0	321 (308-340)	413 (340-500)	66.7
VI	3	10.0	347 (335-360)	570 (500-620)	33.3
VII	4	13.3	378 (360-415)	695 (580-960)	25.0
VIII	9	30.0	399 (355-430)	889 (580-1180)	44.4
IX	3	10.0	422 (405-430)	1127 (1020-1220)	66.7
X	2	6.7	440 (410-470)	1210 (960-1460)	100.0

TABLE VII. Northern pike from Sawn Lake, July, 1969.

Age Class	Sample Size	% of Sample	$\bar{x}$ fork length (range) mm.	$\bar{x}$ weight (range) gms.	% Female
V	5	62.5	594 (540-635)	1310 (1040-1590)	40.0
VI	3	37.5	657 (625-685)	1680 (1340-2160)	100.0

TABLE VIII. Rates of infestation (R.O.I.) of *Triaenophorus crassus* in lake whitefish from Sawn Lake.

Date	No. of fish examined	No. infested	Weight in pounds	No. of cysts	R.O.I. (cysts/100 lbs.)
23-XI-45	100	65	219.3	184	83.9
4-II-58	32	29	73.0	183	250.7
3-X-60	13	13	23.7	159	662.5
20-VI-69	30	28	47.4	138	291.0

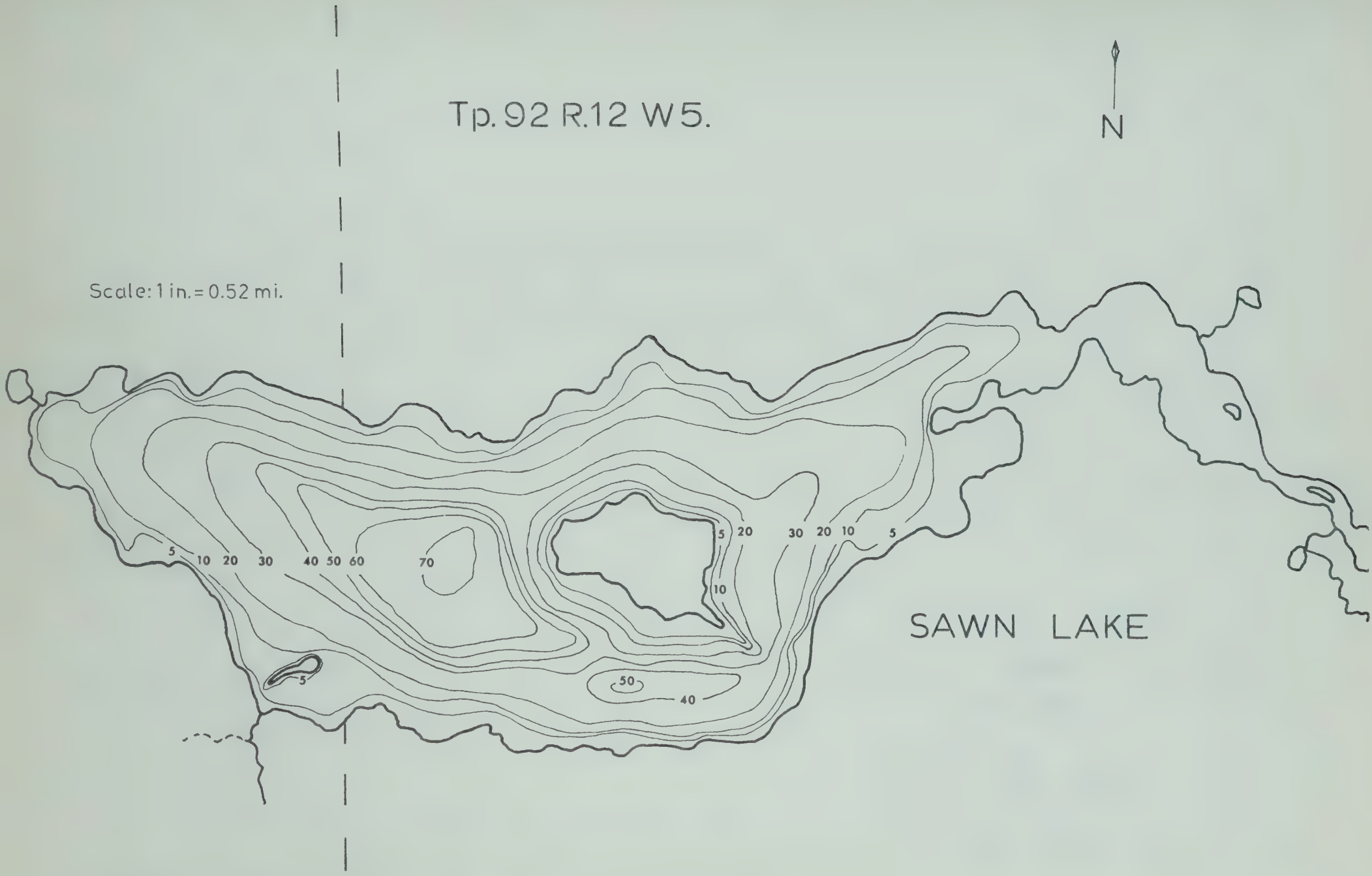


Figure 1. Bottom contours of Sawn Lake. Depths in feet. Map constructed from data obtained during survey.

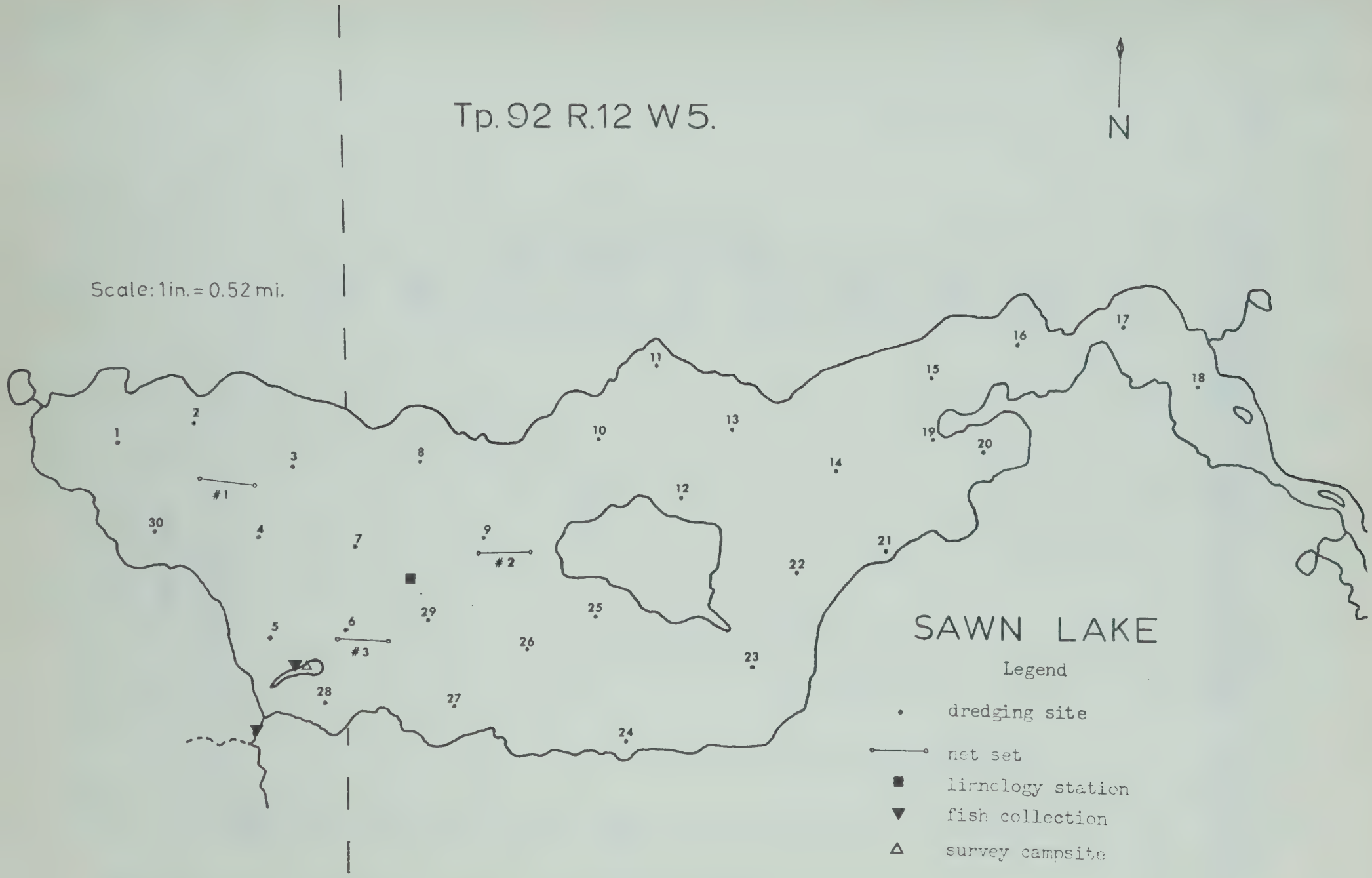


Figure 2. Location of dredging sites, net sets, limnology station and fish collections on Sawn Lake, July 17-24, 1969.

Figure 3. Lake whitefish from Sawn Lake. The figures show the range and mean of fork lengths of each age class. Sample sizes are indicated.

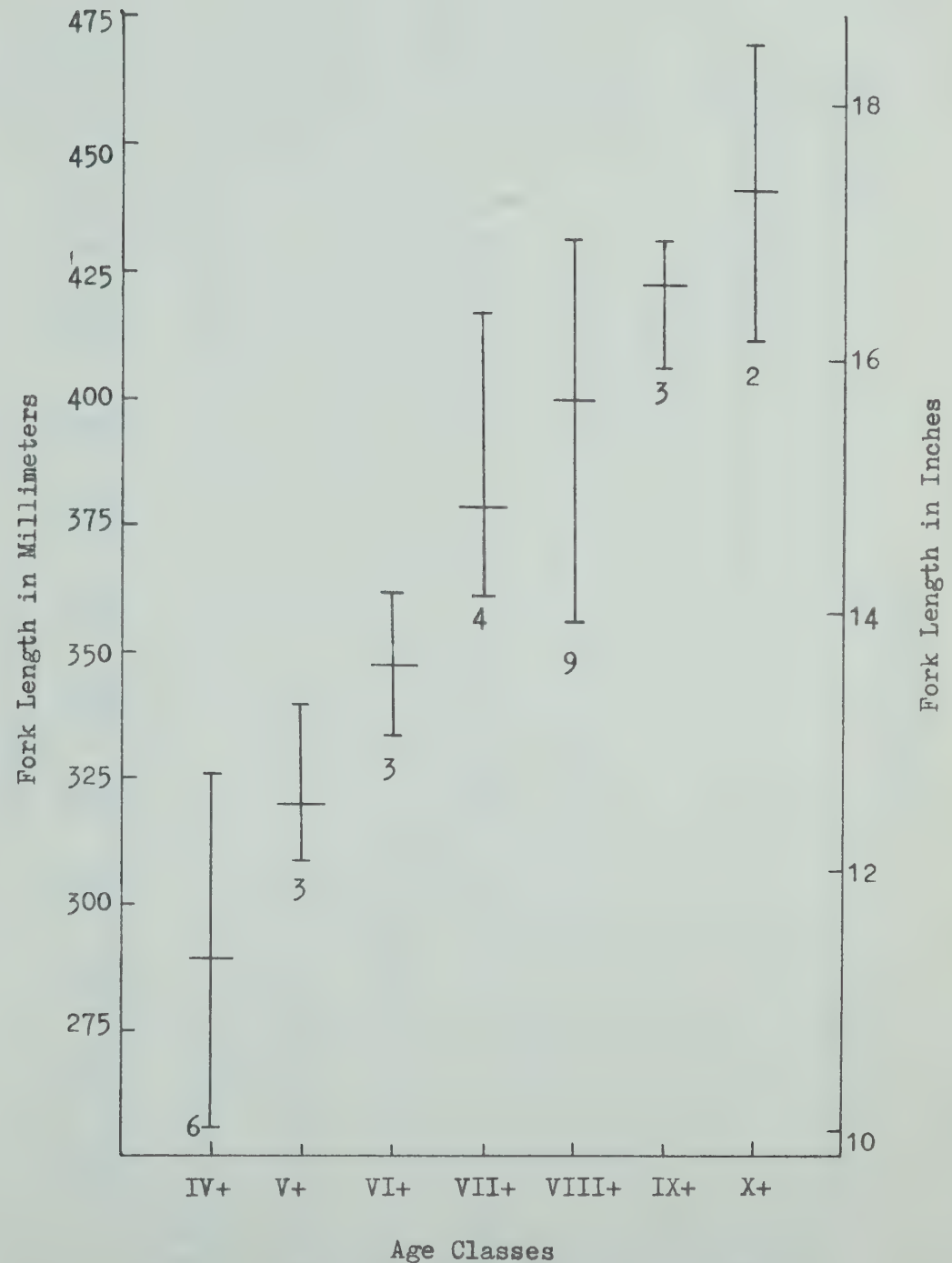


Figure 4. Lake whitefish from Sawn Lake. The figures show the ranges and means of weights of each age class. Sample sizes are indicated.

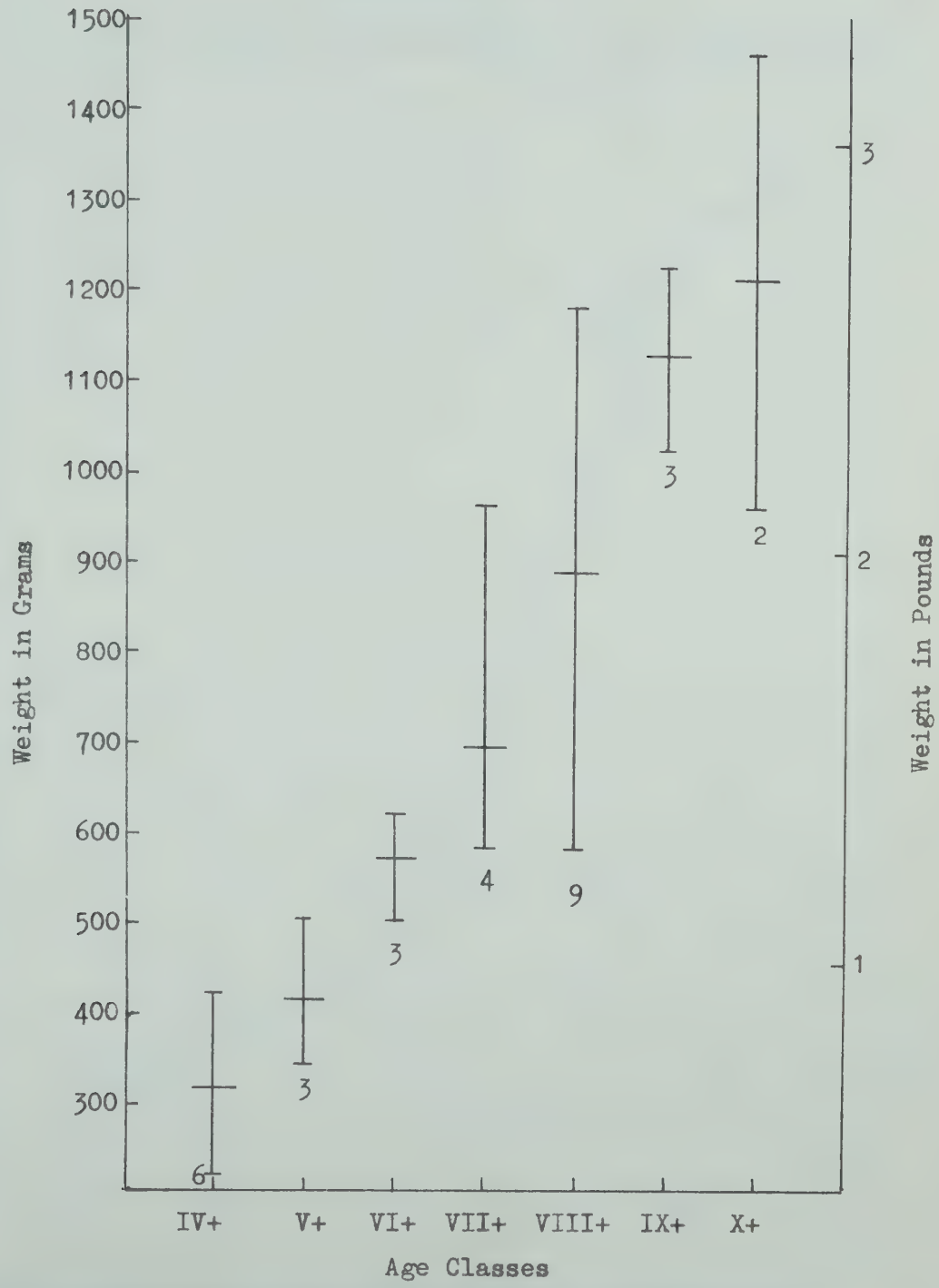
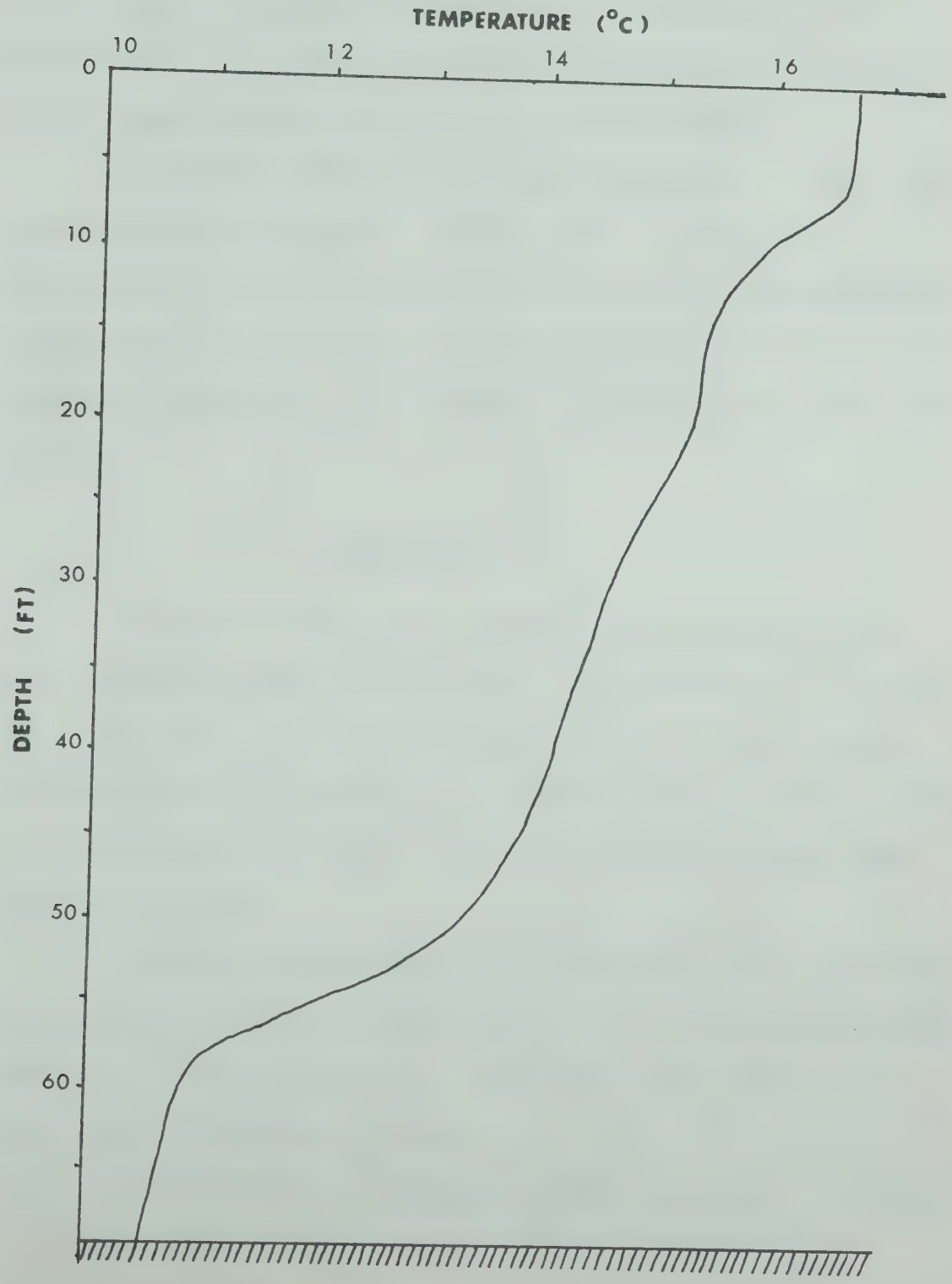


Fig. 5. Thermal profile of Sawn Lake, July 23, 1969.



RUSSELL LAKE

Russell Lake is about 78 air miles northeast of Peace River in Township 93, Range 12, west of the 5th meridian (latitude 57° 03' N and longitude 115° 51' W). This lake is located at an altitude of 2,510 feet and is drained by Russell Creek, a tributary of the Wolverine River. The Wolverine River flows into the Peace River a few miles upstream from Carcajou (Fig. A, INTRODUCTION).

A survey to determine the fishery potential of Russell Lake was conducted from 28 July to 4 August, 1969. As this lake is inaccessible to wheeled vehicles during the summer, men and equipment were moved in by a floatplane. Russell Lake has never been opened for commercial fishing and no catch records or previous cysts counts are available.

Morphometry

The total surface area of Russell Lake was calculated as being 2.37 square miles (1,516.8 acres). The shoreline is 11.9 miles long, resulting in a shoreline development factor of 2.18. Maximum effective length is 2.76 miles in a southwest direction and the maximum effective width is 1.40 miles. (All of these dimensions were taken from a 1:21,120 map).

Depths were determined with an echo sounder and a contour map was plotted from the data obtained (Fig. 1). The volume was calculated to be 17,934 acre feet, producing a mean depth of 11.8 feet. The maximum depth recorded was 23 feet.

The lake bottom is predominantly ooze and most of the shore-

line is mud, although there are some gravel regions. The only sand beach is located on the eastern shore at the mouth of an intermittent influent creek. Aquatic vegetation was very abundant. The shallow northern extension of the lake was heavily congested with submergent types, while reed beds occurred along much of the shoreline. At the time of the survey all of the inflowing streams and the outlet were shallow or had dried up completely. Consequently, no stream surveys or fish collections were undertaken.

Russell Lake is set among rolling hills which are covered by a thick spruce and poplar forest. Willows and birch are also present, but were limited to a thin fringe around the lakeshore. Wildlife observed by the survey crew included several families of scoters, some loons and ravens, a pair of eagles, and a single cow moose.

Water Chemistry

A single limnology station was set up at the site shown in Figure 2. The water at this spot was 23 feet deep and a dredging showed that the bottom consisted of brown ooze. The air temperature was 22.5°C and there was a 10-15 m.p.h. wind blowing from the west. The transparency rating was 8.5 feet. The water temperatures were measured with a thermistor and a reading was taken every 5 feet. Temperatures ranged from 18°C at the surface to 17°C at the bottom and there was no evidence of thermal stratification.

Two water samples were taken one at the surface and one at a depth of 23 feet. The dissolved oxygen was 8 ppm., both at the surface and at the bottom while pH was 8.4 at the surface and 8.8 at the

bottom. The other analysis results are shown in Table II. A Hach kit was used to determine all of the analysis results with the exception of pH which was found with a Hellige comparator. A conductivity meter was not available at this time and so no information on the dissolved solids content of this water could be obtained.

Plankton

A single vertical haul, taken from a depth of 20 feet, was made at the limnology station. A Wisconsin plankton net with a mouth diameter of 20 cms. and # 20 mesh silk was used. The species composition of this haul was similar to those found in Haig and Sawn Lakes. Table III shows the species encountered and provides an estimate of their relative abundance. A displacement volume of 2.8 mls. was calculated for the plankton sample. This was done by removing a 40 ml. aliquot from a well-mixed sample and then centrifuging it at 2,000 rpm for 20 minutes.

Bottom Fauna

A total of 15 $\frac{1}{4}$ square foot Ekman dredgings revealed that most of the lake bottom was an organic ooze. The material from the dredgings was washed through a screen bottom bucket (25 meshes per inch) and the living organisms were collected for later analysis.

Pelecypods were numerically dominant, while Amphipods, Gastropods, and Chironomids were also fairly abundant. The numbers of these and other groups encountered are shown by Table IV. The standing crop of bottom fauna was calculated as 889 organisms per square meter.

Fish Fauna

Three overnight net sets were made during the survey. Each set was 200 yards long and the mesh sizes used are shown in Table V. Only four species of fish were taken from Russell Lake. These were northern pike (Esox lucius), burbot (Lota lota), white sucker (Catostomus commersoni), and single yellow perch (Perca flavescens). No collections were made using seines or rotenone.

Northern pike

Thirty-three northern pike were netted and of these 30 were examined. Lengths, weights, and sexual maturity were recorded and scale samples were taken for age determination. These fish were quite small (largest taken weighed just over 3 pounds) and were maturing between 3 and 4 years of age. The growth statistics are shown in Table VI and Figure 3.

Other species

Tables VII and VIII show the length, weight, and age class figures for the burbot and white sucker samples. The solitary yellow perch which was taken was not examined.

Discussion and Conclusion

As indicated by the survey results, Russell Lake has very little potential beyond that of a casual pike fishery. The lake's remoteness and it's predominantly mud shoreline would tend to discourage any recreational angler.

TABLE I. Morphometry of Russell Lake. (Soundings were taken with a Furuno echo sounder during August, 1969). Other data were taken from maps at a scale of three inches to one mile.

LOCATION: Tp. 93, R. 12, W. 5

AREA: 2.37 sq. mi. (1,516.8 acres)

VOLUME: 17,954.2 acre feet

SHORELINE: 11.9 miles

SHORELINE DEVELOPMENT FACTOR: 2.18

MAXIMUM LENGTH: 2.76 miles

MAXIMUM EFFECTIVE LENGTH: 2.76 miles

MAXIMUM WIDTH: 1.40 miles

MAXIMUM EFFECTIVE WIDTH: 1.40 miles

MEAN WIDTH: 0.86 miles

MAXIMUM DEPTH: 23 feet

MEAN DEPTH: 11.8 feet

DEPTH DISTRIBUTION:

	Acres	% Surface Area
Surface Area	1,516	100
5 feet plus	1,248	82.3
10 feet plus	966.4	63.7
15 feet plus	544	35.9
20 feet plus	147.2	9.7

TABLE II. Water Chemistry, Russell Lake. Both samples were taken at the limnology station.

Sample	1	2
Date	1-VIII-69	1-VIII-69
Depth (feet)	surface	23
Temperature ($^{\circ}$C)	18	17
Dissolved oxygen (ppm)	8	8
Phenolphthalein alkalinity (ppm $CaCO_3$)	0	0
Total alkalinity	180	190
Calcium hardness (ppm $CaCO_3$)	65	70
Total hardness (ppm)	90	95
pH	8.4	8.8

TABLE III. Plankton sample, Russell Lake, August 1, 1969. The sample consisted of a 20 foot vertical haul using a Wisconsin plankton net with number 20 mesh silk and a mouth diameter of 20 cms.

Group	Relative Abundance*
A. Phytoplankton	
Cyanophyta	
Anabaena	3
Microcystis	4
Nostoc	3
Phormidium	4
Chlorophyta	
Pediastrum	1
Spirogyra	1
Chrysophyta	
Fragilaria	2
Tabellaria	4
Stephanodiscus	3
Pyrrhophyta	
Ceratium	2
B. Zooplankton	
Rotifera	
Rotifers	tr.
Bryozoa	
Ectoprocta (statoblasts)	2
Arthropoda	
Cladocerans	tr.
Copepods	2
Volume of Sample	2.80 ml.

(Calculated by centrifuging 40 ml. aliquot @ 2,000 rpm for 20 min.)

* Relative Abundance Scale: trace, 1, 2, 3, 4, 5, bloom.

TABLE IV. Bottom fauna analysis, Russell Lake. A total of 15-¼ sq. ft. dredgings were taken on July 30, 1969. The following figures are standardized to square meters.

Organisms	No./m^2	% Total No.
Chironomids	100	11
Trichoptera	18	2
Amphipoda	179	20
Oligochaeta	32	4
Hirudinea	8	.9
Pelecypoda	418	47
Gastropoda	126	14
Chaoborus	8	.9
TOTAL	889	

TABLE V. Summarized catch record for Russell Lake, July, 1969.

Date Set & Pulled	Set No.	Mesh Size	Set Length	Set Depth (ft.)	Northern pike	White sucker	Burbot	Total
28-29-VII-69	1	2½	50 yds	20	3	2	0	5
28-29-VII-69	1	3½	50 yds	20	4	0	1	5
28-29-VII-69	1	4½	50 yds	20	0	2	4	6
28-29-VII-69	1	5½	50 yds	20	0	0	9	9
29-30-VII-69	2	2½	50 yds	20	6	0	0	6
29-30-VII-69	2	3½	50 yds	20	4	1	0	5
29-30-VII-69	2	4½	50 yds	20	0	4	1	5
29-30-VII-69	2	5½	50 yds	20	0	0	6	6
30-31-VII-69	3	2½	50 yds	15	11	0	0	11
30-31-VII-69	3	3½	50 yds	15	5	1	0	6
30-31-VII-69	3	4½	50 yds	15	0	2	0	2
TOTALS					33	12	21	66

TABLE VI. Northern pike from Russell Lake, July, 1969.

Age Class	Sample Size	% of Sample	$\bar{x}$ fork length (range) mm.	$\bar{x}$ weight (range) gms.	% Female
III	3	10.0	417 (375-465)	480 (360-660)	66.7
IV	5	16.7	465 (400-515)	768 (540-960)	40.0
V	19	63.3	495 (450-570)	883 (700-1460)	52.6
VI	3	10.0	579 (550-620)	1227 (1080-1420)	100.0

TABLE VII. Burbot from Russell Lake, July, 1969.

Age Class	Sample Size	% of Sample	$\bar{x}$ fork length (range) mm.	$\bar{x}$ weight (range) gms.	% Female
IV	1	7.1	525	1220	100.0
VI	5	35.7	693 (675-710)	2364 (1940-2820)	60.0
VII	5	35.7	623 (560-715)	1848 (1640-2540)	80.0
VIII	2	14.3	718 (705-730)	2590 (2460-2720)	100.0
IX	1	7.1	765	2780	100.0

TABLE VIII. White sucker from Russell Lake, July, 1969.

Age Class	Sample Size	% of Sample	$\bar{x}$ fork length (range) mm.	$\bar{x}$ weight (range) gms.	% Female
IV	1	8.3	350	620	0.0
V	6	50.0	432 (415-455)	1143 (980-1340)	50.0
VI	4	33.3	430 (415-460)	1185 (1000-1400)	25.0
IX	1	8.3	505	2020	100.0

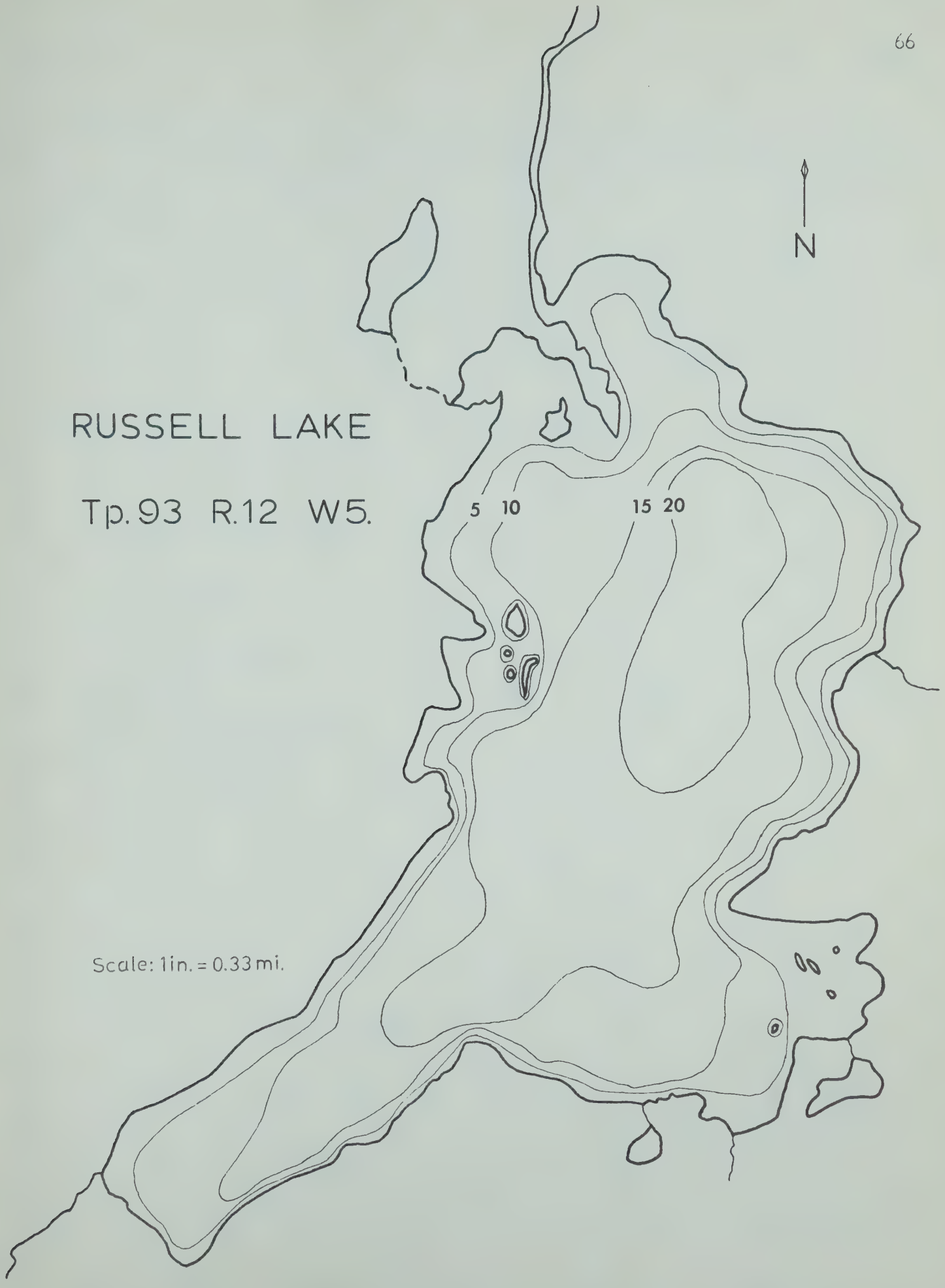


Figure 1. Bottom contours of Russell Lake. Depths in feet. Map constructed from data obtained during survey.

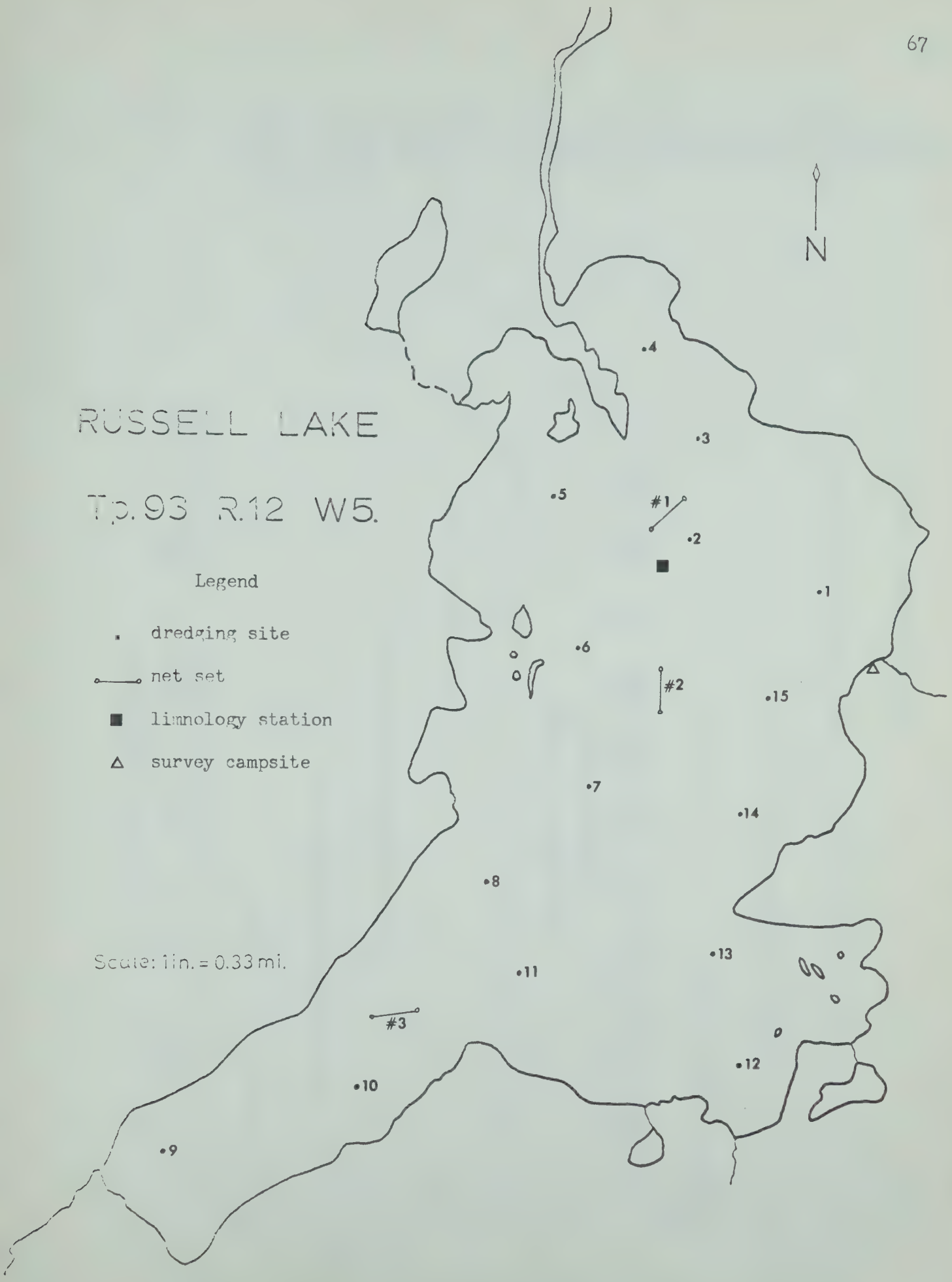
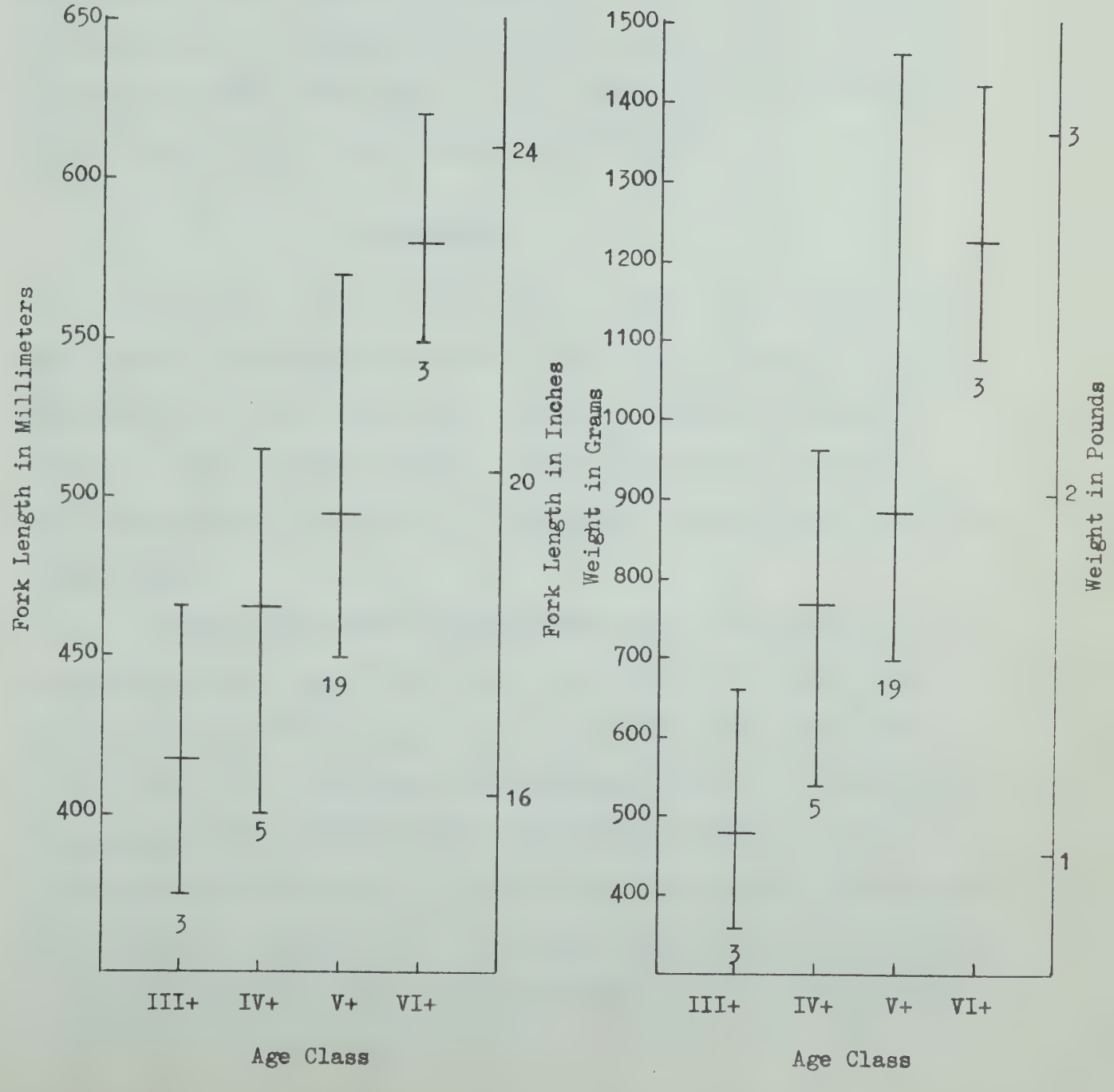


Figure 2. Location of dredging sites, net sets, and limnology station on Russell Lake, July 28 - August 4, 1969.

Figure 3. Northern pike from Russell Lake. The figures show the ranges and means of fork lengths and weights for each age class. Sample sizes are indicated.



TALBOT LAKE

Talbot Lake is at an approximate altitude of 2,250 feet and is drained by the Buffalo River, a tributary of the Peace River. The lake is located about 65 miles south-southeast of Fort Vermilion in Townships 97 and 98, Range 11, west of the 5th meridian (latitude 57° 28' N, longitude 115° 44' W). Talbot lake was surveyed from 5-13 August, 1969. The lake is inacessible to wheeled vehicles and the survey crew and their equipment were flown in by means of a float equipped aircraft. Talbot Lake has never been opened for commercial fishing and no previous catch records are available.

Morphometry

The dimensions of Talbot Lake were taken from a 1:15,840 map. The area was calculated as being 2.51 square miles (1,606 acres) and the shoreline is 7.05 miles long, producing a shoreline development factor of 1.27. Maximum effective length is 2.22 miles in a west-southwest direction, resulting in a good mixing action by the prevailing summer winds.

Depth measurements were obtained with an echo sounder and a contour map (Fig. 1) was plotted from the results. The volume of the lake was calculated to be 37,341 acre feet, which gives a mean depth of 18.5 feet. The maximum depth recorded was 50 feet. As shown by the contour map, the lake bottom drops off fairly quickly to a depth of 20 feet; however only 29% of the bottom area is at a depth of 30 feet or more (Table I). Although most of the lake bottom is ooze, the shoreline is predominantly rocky, with a sand beach occurring on the northeastern

shore. Some deposits of sand and boulders occur in the shallows at the southern inlet and along the northeastern shore.

Aquatic vegetation was limited to the occasional patch of emergents, with some submergents at the southern inlet and at the outlet. A plankton bloom was in progress at the time of the survey, giving the water a "soupy" effect.

Talbot Lake is surrouned by hills which are covered by a thick mixed forest of poplar and spruce. All of the inlets and the outlet were either dry or very shallow consequently no stream stations were conducted. Wildlife observed at Talbot Lake included ducks, grebes, gulls, several wolves, a mink and a single cow moose.

Water Chemistry

The limnology station was conducted on 11 August, 1969 in 40 feet of water. The weather was cloudy with a steady S.W. wind and the air temperature was 14°C. The water transparency reading was 6.5 feet. The water temperature was taken at 5 foot intervals by means of a thermistor. Temperatures ranged from 13.5°C at the bottom to 17.0°C at the surface.

Two water samples were taken at the limnology station, one at the surface and one at 40 feet. A Hellige comparator was used to determine pH and the remaining analyses were carried out with a Hach kit. The conductivity meter was not functioning at this time, so no information on the dissolved solids content could be obtained.

The dissolved oxygen was 12 ppm. at the surface and 2 ppm. at 40 feet, while the pH was 8.8+ at the surface and 7.2 at the bottom. The water temperature dropped 1.5°C between 35 and 40 feet. This sudden

temperature change, combined with the pH and dissolved oxygen results, indicate that the lake was thermally and chemically stratified at that time. The remaining analysis results are shown in Table II.

Plankton

A 20 foot vertical plankton haul was taken at the limnology station using a Wisconsin plankton net with number 20 mesh silk and a mouth diameter of 20 cms. Subsequent analysis showed that the bloom conditions observed by the survey crew were caused by the blue-green alga Aphanizomenon. The species composition of the plankton taken in this sample differed markedly from that observed in samples from Haig, Sawn, or Russell Lake. The only other species which was abundant was Microcystis (Cyanophyta). The remaining species included Anabaena (Cyanophyta), Fragilaria (Chrysophyta), and Ceratium (Pyrrophyta) and were limited to trace amounts. Zooplankton consisted of cladocerans and copepods, both of which were present in trace amounts. A displacement volume of 13.2 ml. was calculated for this sample by centrifuging a 20 ml. aliquot for 20 minutes @ 2,000 rpm.

Bottom Fauna

Twenty 6" x 6" Ekman dredgings were taken in order to sample the bottom fauna. The dredgings were washed in a screen bottom bucket (25 meshes per inch) and the living organisms were removed and preserved for later identification.

The bottom of Talbot Lake consisted almost entirely of brown ooze and thus it is not surprising that chironomids were the dominant benthic group, both in numbers and volume. Table III shows the numbers

and volumes of other faunal groups present. The standing crop of bottom fauna was calculated to be 861 organisms per square meter.

Fish Fauna

Three overnight net sets were made during the survey. Each set was 200 yards long and consisted of nets of various mesh sizes (Table IV). Only three fish species were netted: northern pike (Esox lucius), burbot (Lota lota), and white sucker (Catostomus commersoni). Of these, only the northern pike were examined. A beach seine haul, which was taken adjacent to the campsite (Fig. 2), revealed the presence of two additional species. These were yellow perch (Perca flavescens), and spottail shiners (Notropis hudsonius).

Northern pike

Forty-six northern pike were netted and 30 were examined. As shown by Table V these fish were fairly small, the largest one taken weighing just over 5 pounds. All but one of the pike taken from Talbot Lake were sexually mature. The single immature specimen was 5 years old.

Discussion and Conclusion

The survey results showed that Talbot Lake has no potential for either a commercial or a trophy fishery. Although the northern pike are somewhat undersized, this lake might be utilized as a recreational fishery if it ever becomes accessible by road.

TABLE I. Morphometry of Talbot Lake. Soundings were taken with a Furuno echo sounder during August, 1969. Other data were taken from 1:15,840 maps.

LOCATION: Tp. 97, R. 11, W. 5

AREA: 2.51 sq. mi. (1,606 acres)

VOLUME: 37,341.7 acre feet

SHORELINE: 7.05 miles

SHORELINE DEVELOPMENT FACTOR: 1.27

MAXIMUM LENGTH: 2.22 miles

MAXIMUM EFFECTIVE LENGTH: 2.22 miles

MAXIMUM WIDTH: 1.97 miles

MAXIMUM EFFECTIVE WIDTH: 1.97 miles

MEAN WIDTH: 1.13 miles

MAXIMUM DEPTH: 50 feet

MEAN DEPTH: 18.5 feet

DEPTH DISTRIBUTION:

	Acres	% Surface Area
Surface Area	1,606	100
5 feet plus	1,459	90
10 feet plus	1,281	80
20 feet plus	1,139	71
30 feet plus	467	29
40 feet plus	96	6
50 feet plus	13	0.8

TABLE II. Water Chemistry, Talbot Lake. Sample 1 was taken at the surface and sample 2 at 35 feet, at the limnology station site.

Sample	1	2
Date	11-VIII-69	11-VIII-69
Depth (feet)	surface	35
Temperature (^{o}C)	17	13.5
Dissolved oxygen (ppm)	12	2
Phenolphthalein alkalinity (ppm $CaCO_3$)	nil	nil
Total alkalinity	200	180
Calcium hardness (ppm $CaCO_3$)	72	80
Total hardness (ppm)	100	105
pH	8.8+	7.2

TABLE III. Bottom fauna analysis, Talbot Lake. A total of 20 - ¼ sq. ft. dredgings were taken on August 12, 1969. The following figures are standardized to square meters.

Organisms	No./m^2	% Total No.	Volume/m^2 (mls.)
Chironomidae	438	51	9.3
Ephemeroptera	2	-	-
Amphipoda	204	24	-
Oligochaeta	51	5	.2
Pelecypoda	115	13	-
Hirudinea	4	-	-
Gastropoda	27	3	-
Chaoborus	20	2	-
TOTALS	861		9.5

TABLE V. Northern pike from Talbot Lake, August, 1969.

Age Class	Sample Size	% of Sample	$\bar{x}$ fork length (range) mm.	$\bar{x}$ weight (range) gms.	% Female
V	3	10.0	531 (496-563)	1050 (920-1120)	0.0
VI	20	66.7	603 (565-650)	1472 (1050-1910)	65.0
VII	7	23.3	675 (665-704)	1956 (1670-2300)	57.1

TABLE IV. Summarized catch record for Talbot Lake, August, 1969.

Date Set & Pulled	Set No.	Mesh Size	Set Length	Set Depth (ft.)	Northern pike	Burbot	White sucker	Total
5-6-VIII-69	1	2½	50 yds	25	2	0	0	2
5-6-VIII-69	1	3½	50 yds	25	12	0	0	12
5-6-VIII-69	1	4½	50 yds	25	3	0	0	3
5-6-VIII-69	1	5½	50 yds	25	0	2	1	3
6-7-VIII-69	2	2½	50 yds	25	0	0	0	0
6-7-VIII-69	2	3½	50 yds	25	8	0	0	8
6-7-VIII-69	2	4½	50 yds	25	6	0	0	6
6-7-VIII-69	2	5½	50 yds	25	3	2	0	5
12-13-VIII-69	3	2½	50 yds	30	0	0	0	0
12-13-VIII-69	3	3½	50 yds	30	3	0	0	3
12-13-VIII-69	3	4½	50 yds	30	8	0	0	8
12-13-VIII-69	3	5½	50 yds	30	1	0	0	1
TOTALS					46	4	1	51

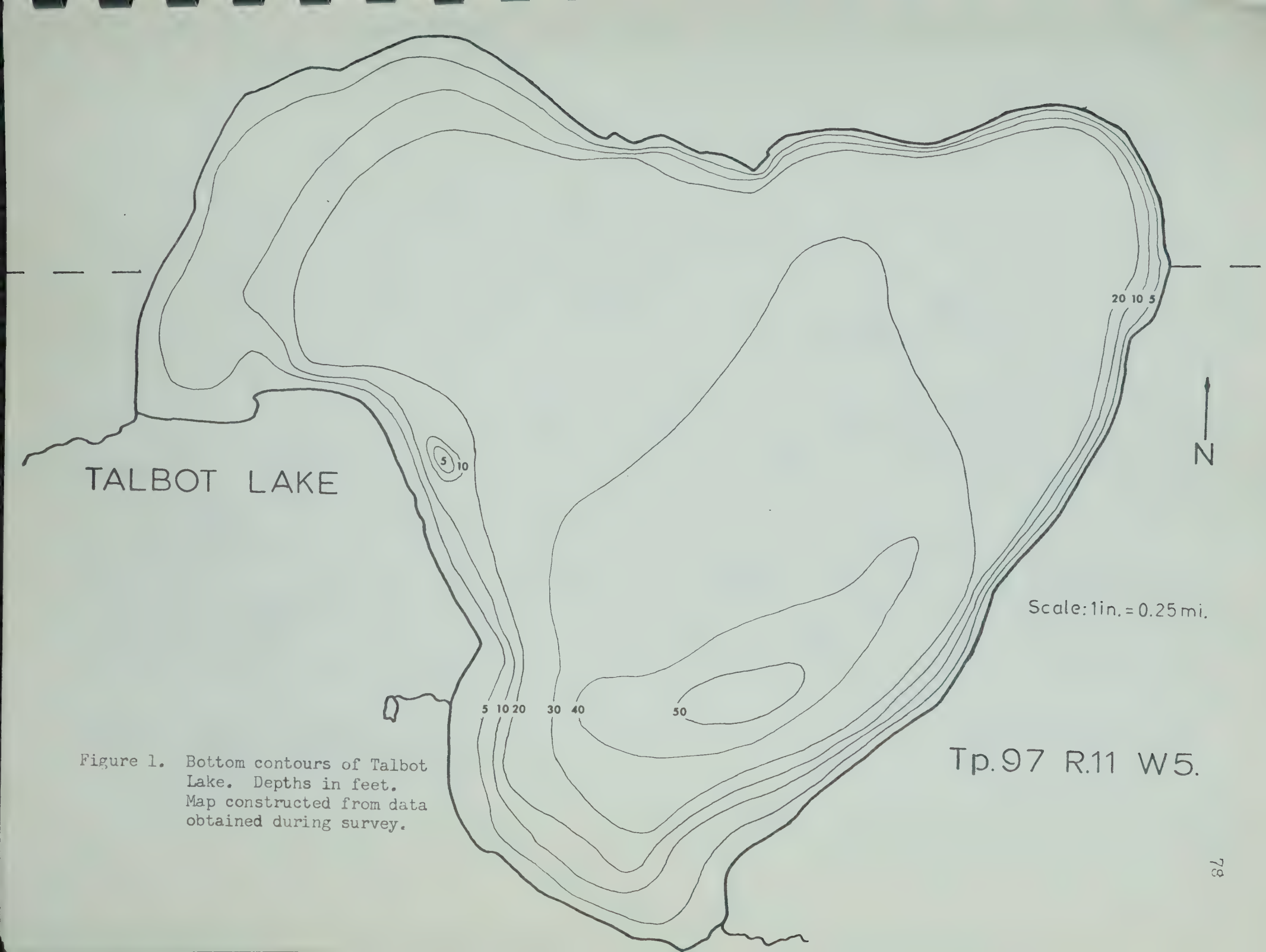


Figure 1. Bottom contours of Talbot Lake. Depths in feet. Map constructed from data obtained during survey.

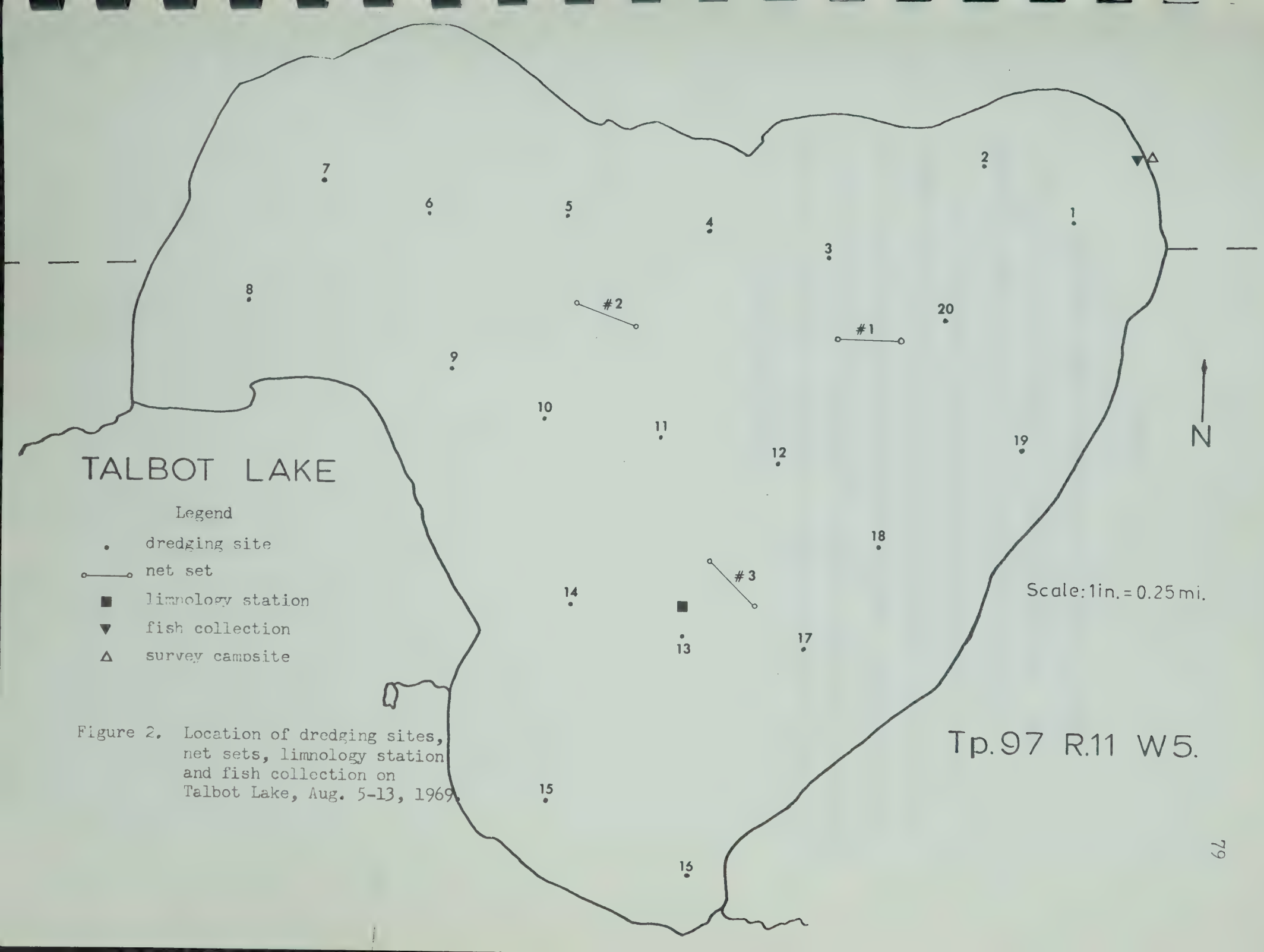


Figure 2. Location of dredging sites, net sets, limnology station and fish collection on Talbot Lake, Aug. 5-13, 1969.

SUMMARY

The survey results demonstrate that the trophy fishery potential of the lakes examined is virtually non-existent. The commercial fishery potential is poor, and for the most part is limited to the mink feed market. Despite these short comings, Haig, Wadlin, and Sawn Lakes do hold some promise as recreational and casual fishing areas. Haig and Wadlin Lakes are presently linked to population centres by road, and are already being used (to a limited degree) for recreational purposes. In this area, where lakes of recreational value are few, these lakes do have a significant value.

ACKNOWLEDGEMENTS

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